SUBJECT INDEX.

[References to the papers read before the Institute are indicated by the word *Paper* following the page number. The letter *P.* denotes a reference in Section I. of the Journal which contains the reports of the proceedings of meetings, the papers read, and the discussions thereon. The letter *A.* denotes a reference to the section dealing with abstracts.

Indexing of Alloy Steels and Other Alloys. In the indexing of alloy steels, carbon and iron are ignored and the alloying elements contained in the steel are arranged in alphabetical order; for example, all references to nickel-chromium-molybdenum steel will be found under the heading chromium-molybdenum-nickel steel. In the indexing of other alloys, carbon and iron, when present, are included in the title; iron, when present, is always mentioned first and the other elements follow in alphabetical order, carbon being in all cases mentioned last. Examples: "Iron-silicon-carbon alloys" and "iron-chromium-nickel-carbon alloys."]

Abbreviations for metals and alloys, 33*A*.
Abrasion :
blast-furnace slag-concrete, 73*A*.
see also Wear.
Acid Electric-Furnace Practice, 101*A*, 148*A*.
Acid Open-Hearth Process, slag metal reactions, 99*A*.
Acid Open-Hearth Research Assoc., activities, 99*A*.
Acid-Resistant Iron, barley-shell structure, 105 *Paper*.
Air :
compressed, supply in foundries, 75*A*.
conditioning, *see* Blast, moisture control.
Aircraft-Engine Cylinder Liners, centrifugal casting, 45*A*.
Aircraft-Engine Cylinders, use of aluminium for bonding cooling fins, 53*A*.
Aircraft-Engine Exhaust Manifolds, use of chromium-nickel steel, 158*A*.
Aircraft-Engine Parts :
failure, 156*A*.
forging, 150*A*.
Aircraft Parts, centrifugal casting, 146*A*.
Allis-Chalmers Manufacturing Co., spectrographic laboratory, 161*A*.
Alloying Elements, residual, determination in steel, 100*A*.
Alloys :
aluminium, stress-corrosion cracking, 113*A*.
arc deposited, for cutting tools, 108*A*.
cast, segregation in, 48*A*.
chromium - cobalt - nickel, fatigue strength, 29*A*.
cobalt, scaling, 60*A*.
iron, binary, systematics, 140*A*.
iron, strain hardening during cold rolling, 57*A*.
iron, transformations, 140*A*.
iron-aluminium-chromium, oxidation of aluminium, 115*A*.
iron-aluminium-chromium, oxide films, 115*A*.
iron-chromium-cobalt, fatigue strength, 29*A*.
iron-cobalt, magnetic properties, 157*A*.
Alloys (*contd.*)—
iron-cobalt-tungsten, transformations, effect of chromium, 66*A*.
iron-molybdenum, diffusion of molybdenum, 66*A*.
iron-nickel, damping capacity, 28*A*.
iron-nickel, elastic modulus, 28*A*.
iron-silicon, cleavage structure, 63*A*.
magnesium, spot welding, 20*A*.
manganese-silicon-zirconium, for inoculation of cast iron, 145*A*.
stress corrosion, 112*A*.
Aluminium :
addition to galvanising baths, 82*A*.
deoxidation of steel, effect on strain-age embrittlement, 55*A*.
effect in high-speed steel, cutting capacity, 106*A*.
oxidation in iron-aluminium-chromium alloys, 115*A*.
spot welding, 20*A*.
spraying, 130*A*.
use for bonding cooling fins to aircraft engine cylinders, 53*A*.
Aluminium Alloys, stress-corrosion cracking, 113*A*.
Aluminium - Chromium - Titanium Steel, creep, 138*A*.
Aluminium-Coated Steel, spot welding, 80*A*.
Aluminium Dross, as a substitute for fluorspar, 100*A*.
Aluminium Prophylaxis, 97*A*.
Aluminium Steel, nitriding, 61*A*.
Aluminium Therapy, 97*A*.
Alumino-Silicate Refractories, *see* Refractory Materials.
American Steel & Wire Co., wire mill, 13*A*.
Ammonium Sulphate, production, 144*A*.
Amplidyne, use for controlling run-out tables, 15*A*.
Analysis, 68*A*., 116*A*., 159*A*.
basic open-hearth slags, 161*A*.
magnetic, 64*A*.
micro, 117*A*.
order of stating elements, 161*A*.
slag, 69*A*.
spectrum, 69*A*., 100*A*., 117*A*., 161*A*.
spectrum, graphic calculator for, 69*A*.

Analytical Samples, issued by National Bureau of Standards, 117*A*.
Anderson Sponge Iron Process, 4*A*.
Annealing :
bicycle parts, 18*A*.
bright, strip, 18*A*.
cartridge cases, steel, 18*A*.
cold-rolled iron, 57*A*.
effect on work-hardened wire, 181*P*.
Annual Meeting, proceedings, 1*P*.
Anti-Piping Compounds, for ingots, 40*A*.
Arc Furnaces, *see* Electric Furnaces.
Armco Iron :
recrystallisation after hot-deformation, 135*A*.
work-hardening and reannealing, 181 *Paper*.
Asbestos, properties, 41*A*.
Associates, election, 8*P*.
Atlas Steels, Ltd., rolling-mill plant, 103*A*.
Atmospheres :
control in reheating furnaces, 12*A*.
controlled, production, 78*A*.
controlled, use of lithium, 78*A*.
electric furnace, effect on hydrogen and nitrogen in steel, 48*A*.
furnace, lithium-treated, 153*A*.
furnace, moisture content, 2*A*.
Austempering, 133 *Paper*, 19*A*., 53*A*., 106*A*., 138*A*.
Austenite :
activities of carbon and carbide, 35*A*.
diffusion rate of molybdenum, 66*A*.
retained, transformation at low temperatures, 65*A*.
transformation, isothermal, 16*A*.
unstable, tensile properties and low-temperature decomposition products, 93 *Paper*.
Austenitic Steel :
nitrided, structure, 128*A*.
properties at low temperatures, 63*A*.
Austenitic Weld Metal, properties at high temperatures, 31*A*.
Australia, moulding sands, 123*A*.
Automobile Castings, production, 8*A*.
Automobile Construction :
alloy cast iron for, 94*A*.
steel for, 111*A*.
Automobile Parts :
centrifugal casting, 146*A*.
heat treatment, 152*A*.
Automobile Steel, hardenability, 87*A*.
Avery Fatigue Testing Machine, 157*A*.

Bagnall-Bethel Nozzle, 100*A*.
Ball Bearing Steel, magnetic tests, 157*A*.
Ball-Race Steel, chromium, heat treatment, 18*A*.
Balls, wear in cylindrical mills, 30*A*.
Bar Mills, 103*A*.
driving, 103*A*.
roll design, 103*A*.
Barley-Shell Structure, high-silicon iron, 105 *Paper*.
Bars, defects in, 103*A*.
Barvoys Process of coal cleaning, 93*A*.
Basic Cupolas, operation, 44*A*.
Basic Electric Furnaces, production of alloy steel, 47*A*.
Basic Electric Steel :
costs, 10*A*.
production, 10*A*.
Basic Open-Hearth Furnaces :
decarburisation rate and oxygen content of steel, 10*A*.
production of alloy steel, 76*A*.
Basic Open-Hearth Practice, phosphorus reactions, 459 *Paper*.
Basic Open-Hearth Process, 505 *Paper*.
phosphorus distribution, 99*A*.
Basic Slag :
analysis, 161*A*.
constitution, 391 *Paper*, 505*P*.
Bearing Races, super-finish, 23*A*.
Bearings :
babbitted, use of tinned cast iron, 83*A*.
design, 14*A*.
rolling-mill, lubrication, 126*A*.
wear-resisting coatings, Parco Lubrizing Treatment, 27*A*.
Belgium, coking industry, 93*A*.
Bend Tests :
case-hardened steel, 84*A*.
structural steel, for determination of weldability, 85*A*.
Bending, stainless steel, calculation of "springback," 135*A*., 151*A*.
Bessemer Converters, refractory materials for, 143*A*.
Bessemer Gold Medal, awarded to H. Wright, 4*P*.
Bethlehem Steel Co., magnetic powder method for detection of defects, 46*A*.
Bibliography, 36*A*., 90*A*., 141*A*.
powder metallurgy, 122*A*.
properties of resistance welds, 21*A*.
stress analysis by X-ray, 139*A*.
Bicycle Parts, annealing, 18*A*.
Bierbaum Hardness Testing Machine, 86*A*.
Billet Mills, 14*A*.
for alloy steel, 14*A*.
guides for, 50*A*.
Billets :
defects in, 103*A*.
defects, surface, 48*A*.
numbering, stamp for, 50*A*.
Black-Oxide Coatings, 67*A*.
Blast, moisture control, 93*A*.
Blast-Furnace Gas :
cleaning, use of cyclone dust catchers, 121*A*.
induction burners for, 120*A*.
use, 144*A*.
use in mixers, 41*A*.
Blast-Furnace Gas Mains, inflation with coke-oven gas, 42*A*.
Blast-Furnace Plant :
Magnitogorsk, 93*A*.
Republic Steel Corp., 76*A*.
Blast-Furnace Slag-Concrete, abrasion, 73*A*.
Blast Furnaces :
blowing, use of aerodynamic turbines, 42*A*.
carbon blocks, 119*A*.

Blast-Furnaces (*contd.*)—
carbon bricks for, 40*A*.
charging, 3*A*.
design, 3*A*., 121*A*.
distribution of charge, 3*A*.
insulation, 143*A*.
linings, failure, 119*A*.
moisture control, 93*A*.
pilot, 121*A*.
profiles, determination, 42*A*.
smelting of Krivoi-Rog ore, 3*A*.
standardisation in Germany, 3*A*.
tuyeres, design, 121*A*.
use of sinter, 43*A*.
Blasting, vapour, 130*A*.
Blooms, defects in, 103*A*.
Bofors Gun, production, 51*A*.
Boilers, cracking, 58*A*.
Bolts :
cold-headed, failure, 58*A*.
high-tensile, production, 49*A*.
Bomb Cases, forging, 151*A*.
Bombs, production, 75*A*.
Bonderising :
steel, 28*A*.
strip, 27*A*.
Boron :
determination in iron and steel, Quinalizarin method, 100*A*.
effect in steel, 138*A*.
use for treating welding electrodes, 53*A*.
Boron Cast Iron, use for lining cylinder liners, 7*A*.
Boron Steel, nitriding, 61*A*.
Brass, lead-bearing, detection of lead by lead prints, 101*A*.
Brassert Sponge Iron Process, 4*A*.
Brazil, steel castings production, 145*A*.
Brazing :
copper-, steel, 80*A*.
high-speed steel, 22*A*.
tools, 22*A*.
Bren Gun Parts, induction hardening, 52*A*.
Briquetting :
swarf, 45*A*.
turnings, 11*A*.
British Columbia, vanadium ore deposits, 118*A*.
British Standard Swelling Test for coal, 2*A*.
Brittleness, temper, alloy steel, 137*A*.
Broaches, heat treatment, 51*A*.
Broken-Hill Proprietary Co., methods of using gaseous fuel, 144*A*.
Bullard-Dunn Pickling Process, 24*A*.
Burners :
design for open-hearth furnaces, 99*A*.
gas, design, 2*A*.
gas, induction, 120*A*.
Burning, steel, 125*A*.
By-Products, quantity produced in America, 99*A*.

Cadmium, electrodeposition, 130*A*.
Cadmium Coatings :
passivation, Cronak process, 25*A*.
passivation, Passival Process, 25*A*.
passivation, Rushtol Passivation "A" Process, 25*A*.
Calibration, load, testing machines, 155*A*.
Cambridge University, corrosion studies, 88*A*.
Canada, vanadium ore deposits, 118*A*.
Canning Industry, American, 132*A*.
Capillarity, metallic surfaces, 83*A*.
Carbide, activity in austenite, 35*A*.
Carbide Dies, for polishing, 14*A*.
Carbides :
chromium, thermodynamic properties, 87*A*.
iron and titanium, in steel, 112*A*.
Carbon :
activity in austenite, 35*A*.
determination in iron and steel, 16*A*., 159*A*.
determination in open-hearth practice, 100*A*.
distribution between titanium and iron in steel, 112*A*.
effect in alloy steel, hardenability, 59*A*.
effect in steel, 28*A*.
solubility in silico-manganese, 4*A*.
Carbon Blocks, *see* Refractory Materials.
Carbon Concentration Gradients, for carburisation process, 78*A*.
Carbon Monoxide, dissociation in contact with iron, 43*A*.
Carbon Refractories, *see* Refractory Materials.
Carbon Steel :
cast, effect of heat treatment, 64*A*.
damping capacity, effect of heat treatment, 45*P*.
effect of heat-treatment, charts showing, 78*A*.
fatigue strength, effect of size of specimen, 86*A*.
graphitisation at sub-critical temperatures, 57*A*.
properties, effect of preferred orientation, 157*A*.
spot welding, 20*A*.
stress corrosion cracking, 113*A*.
Carbonisation, products of, 3*A*.
Carburisation :
carbon concentration gradients, 78*A*.
gaseous, 17*A*.
steel, concentration/depth gradient, 16*A*.
steel, mechanism, 16*A*.
Carburised Molybdenum-Nickel Steel, heat treatment, 18*A*.
Carnegie Illinois Steel Corp., methods of spectrum analysis, 100*A*.
Cartridge Cases :
steel, annealing, 18*A*.
steel, drawing, 12*A*.
steel, induction heating, 153*A*.
steel, production, 150*A*.
steel, varnish coatings for, 133*A*.
Case, J. I. Co., forging process, 102*A*.
Case-Hardened Parts, recarburisation, 105*A*.
Case-Hardened Steel :
bend and impact tests, 84*A*.
impact endurance strength, effect of coatings, 85*A*.
measurement of case depth, 16*A*.
use for springs, 17*A*.

Case-Hardening :
gears, 17*A*.
steel, effect of alloying elements, 16*A*.
Cast Iron :
alloy, production, 94*A*.
analysis, 160*A*.
anti-friction, properties and uses, 5*A*.
boron, use for lining cylinder liners, 7*A*.
chilled, use of tellurium, 95*A*.
chromidium, 94*A*.
chromium-nickel, use for punch tips, 12*A*.
cromol, 94*A*.
desulphurisation, soda-ash method, 5*A*.
effect of vanadium, 138*A*.
fatigue strength, 54*A*.
friction against chromium-plated steel, 31*A*.
gases in, 122*A*.
high-duty, production, 74*A*.
high-phosphorus, effect of molybdenum, 62*A*.
inoculation, 94*A*., 145*A*.
inoculated, properties, 5*A*.
malleable, *see* Malleable Cast Iron.
melting *in vacuo*, 45*A*.
metallurgy, 122*A*.
molybdenum-nickel, use for punch tips, 12*A*.
monikrom, 94*A*.
nickel, use for punch tips, 12*A*.
production in electric furnaces, 95*A*.
quenched, hardness, effect of phosphorus, 87*A*.
superheating, 45*A*.
tensile properties, 54*A*.
tensile strength, effect of rate of straining, 84*A*.
tinning, Kolene process, 83*A*.
welding, use of boron treated electrodes, 53*A*.
Cast Steel :
centrifugal, properties and structure, 303 *Paper*.
effect of heat treatment, 64*A*.
hardenability, 30*A*., 110*A*.
hardenability, effect of grain size, 30*A*.
heat treatment, 106*A*.
Jominy hardenability test, 30*A*.
low-alloy, tensile properties, 31*A*.
properties at low temperatures, 60*A*.
weldability, 20*A*.
Casting :
centrifugal, 8*A*., 146*A*.
centrifugal, cylinder liners, 45*A*.
centrifugal, effect on properties and structure of steel, 303 *Paper*.
centrifugal, speed of rotation, 8*A*.
centrifugal, steel, 98*A*., 124*A*.
chill, 7*A*.
die, 7*A*.
precision, by lost-wax process, 123*A*.
rolls, 14*A*.
Casting Machines :
centrifugal, design and safe operation, 98*A*.
centrifugal, spinning speeds, 98*A*.
Casting Structure, effect of dissolved gases, 100*A*.
Castings :
automobile, production, 8*A*.
centrifugal, characteristics, 8*A*.
centrifugal, properties, 75*A*.
cleaning, use of hydro-blast, 98*A*.
grey iron, use of sink heads, 98*A*.
high-duty, production, 123*A*.
inspection, 147*A*.
iron, moulding, Gödel process, 75*A*.
machine tool, requirements for engineers, 145*A*.
malleable iron, *see* Malleable Iron Castings.
Meehanite, compared with welded steel, 81*A*.
pouring, 147*A*.
radiographic examination, 33*A*.
repetition, production, 123*A*.
runners and risers for, 123*A*.
steel, air hardening, production, 145*A*.
steel, atmospheric head, 366*P*.
steel, defects in, 46*A*.
steel, hot tears, 329*P*.
steel, magnetic powder tests, 156*A*.
steel, production in Brazil, 145*A*.
steel, production, use of graphite rods on risers, 6*A*.
steel, radiographic examination, 46*A*.
steel, runners and risers, 329*P*.
steel, use of feeding compounds, 329*P*.
steel, use of low carbon steel, 147*A*.
steel, water quenching, 19*A*., 53*A*., 79*A*.
steel, welding, 108*A*.
steel, whirl-gate head, 366*P*.
steel, X-ray examination, 225*P*., 74*A*.
welding, 129*A*.
X-ray examination, 98*A*.
Cement, use in moulding sand, 75*A*., 97*A*.
Cementite, effect in malleable cast iron, tensile strength, 55*A*.
Centrifugal Methods for lining cylinder liners with boron cast iron, 7*A*.
Chains :
anchor, production, 81*A*.
production, 125*A*.
Chemical Engineering Equipment :
corrosion, 89*A*.
metals used in, 87*A*.
Chemicals :
consumption in American steel industry, 99*A*.
corrosion resistance of metals, 89*A*.
Chill Casting, 7*A*.
Chilled Cast Iron, use of tellurium, 95*A*.
Chlorine, action on refractory materials, 71*A*.
Chrome Bricks, *see* Refractory Materials.
Chrome Ore, distribution, 1*A*.
Chrome Ore Deposits, Montana, 39*A*.
Chromidium Cast Iron, 94*A*.
Chromite, *see* Refractory Materials.
Chromium :
determination in iron and steel, 116*A*.
effect in high-speed steel, cutting capacity, 106*A*.
effect in iron-cobalt-tungsten alloys, transformations, 66*A*.
effect in steel, hardenability, 59*A*.
electrodeposition, 82*A*., 130*A*.

Chromium-Ball-Race Steel, heat treatment, 18*A*.
Chromium Carbides, thermodynamic properties, 87*A*.
Chromium Coatings :
hard, 25*A*., 131*A*.
porous, Van der Horst process, 25*A*.
produced by diffusion, 25*A*.
wear resistance, 25*A*.
Chromium-Cobalt-Nickel Alloys, fatigue strength, 29*A*.
Chromium-Manganese-Molybdenum-Nickel Steel, effect of titanium, 157*A*.
Chromium-Manganese-Nickel Steel, creep, 138*A*.
Chromium - Manganese - Nickel - Vanadium Steel, nitrided, structure, 128*A*.
Chromium-Manganese-Silicon Steel, stress relief, effect of time and temperature, 105*A*.
Chromium-Molybdenum-Nickel Steel :
fatigue, 110*A*.
hardenability, 65*A*.
hardenability, effect of carbon, 59*A*.
isothermal transformation, 65*A*.
isothermal treatment, 127*A*.
oxidation in corrosive solutions, 115*A*.
spot welding, 20*A*.
temper brittleness and heat embrittlement, 137*A*.
tensile properties and low-temperature decomposition products, 93 *Paper*.
transformations, effect of overheating, 79 *Paper*.
Chromium-Molybdenum-Nickel Steel Tubes, residual stresses due to heat treat ment, 32*A*.
Chromium-Molybdenum-Nickel-Vanadium Steel, segregation, 48*A*.
Chromium-Molybdenum Steel :
fatigue strength, effect of size of specimen, 86*A*.
nitriding, effect of pre-heat treatment, 55*P*.
properties, 61*A*.
stress distribution, determination by X-rays, 33*A*.
stresses, residual, determination, 29*A*.
Chromium - Molybdenum - Steel Tubes, welded, strength, 20*A*.
Chromium-Molybdenum-Vanadium Steel, nitriding, effect of pre-heat treatment, 55*P*.
Chromium-Nickel Cast Iron, use for punch tips, 12*A*.
Chromium-Nickel Steel :
creep, 138*A*.
formability, 158*A*.
hardenability, effect of carbon, 59*A*.
nitriding, 105*A*., 154*A*.
properties at low temperatures, 60*A*.
spot welding, 20*A*.
stress-corrosion cracking, 89*A*., 113*A*.
temper brittleness and heat embrittlement, 137*A*.
tensile strength, effect of fibre, 55*A*.
tensile strength, effect of notches, 55*A*.
use for salt baths, 153*A*.
Chromium-Nickel Steel (*cont.*)—
welded, properties and structural transformation on straining, 87 *Paper*.
Chromium-Nickel-Steel Tubes, cracking, 57*A*.
Chromium-Nickel-Steel Weld Metal, properties at high temperatures, 31*A*.
Chromium-Plated Steel, friction against cast iron, 31*A*.
Chromium Steel :
creep, 138*A*.
effect of elements, 61*A*.
isothermal treatment, 127*A*.
low-carbon, properties, 61*A*.
nitriding, 61*A*., 154*A*.
stress-corrosion cracking, 113*A*.
Chromium-Tungsten Steel, isothermal treatment, 127*A*.
Chromium-Tungsten-Vanadium Steel :
isothermal treatment, 127*A*.
transformation under pressure, 35*A*.
Chrysler Corporation, forging plant, 150*A*.
Clad Steel, stainless, production, 131*A*.
Cleaning :
blast-furnace gas, use cyclone dust-catchers, 121*A*.
castings, use of hydro-blast, 98*A*.
coal, 120*A*.
coal, Barvoys process, 93*A*.
metals, 24*A*., 81*A*., 129*A*.
pipes, 82*A*.
producer gas, 120*A*.
steel prior to welding, 81*A*.
wire, 130*A*.
Cleveland Tractor Co., case-hardening of gears, 17*A*.
Coal :
cleaning, 120*A*.
cleaning, Barvoys process, 93*A*.
coking properties, 2*A*., 120*A*., 144*A*.
coking tests, 93*A*.
determination of fluorine, 117*A*.
determination of volatile matter, furnace for, 161*A*.
hydrogenation, 144*A*.
low-grade, recovery, 120*A*.
molecular structure, 120*A*.
plasticity, 144*A*.
plasticity, measurement by Davis plastometer, 72*A*.
plasticity, measurement by Gieseler plastometer, 72*A*., 73*A*.
pulverised, mixing with fuel oil, for heating open-hearth furnaces, 99*A*.
pulverised, use in heating furnaces, 41*A*.
pulverised, use in malleable-iron furnaces, 95*A*.
rare elements in, 72*A*.
swelling, British Standard test, 2*A*.
swelling pressure, measurement, 72*A*., 73*A*.
Virginia, properties, 117*A*.
Coal-Cleaning Plant, Waterloo Main Colliery, 120*A*.
Coal Deposits, Northumberland and Durham, 118*A*.
Coal Gas, effect on refractory materials, 1*A*.
Coating, metals, 25*A*., 82*A*., 130*A*.

Coatings :
black-oxide, 67*A*.
cadmium, passivation, Cronak process, 25*A*.
cadmium, passivation, Passival process, 25*A*.
cadmium, passivation, Rushtol Passivation "A" process, 25*A*.
chromium, hard, 25*A*., 131*A*.
chromium, porous, Van der Horst process, 25*A*.
chromium, produced by diffusion, 25*A*.
chromium, wear resistance, 25*A*.
effect on case-hardened steel, impact endurance strength, 85*A*.
electrodeposited, specifications, 82*A*.
electrodeposited, on wire, Ecco method, 130*A*.
enamel, adherence, 132*A*.
galvanised, corrosion in water, 67*A*.
galvanised, pliable, 131*A*.
lacquer, for food containers, 83*A*.
lead, properties, 83*A*.
lead, on steel, 132*A*.
organic, use in magnetic powder tests, 59*A*.
oxide, 27*A*.
paint, electrostatic detearing, 84*A*.
paint, protective, 159*A*.
paint, protective value, 133*A*.
Permyron, 27*A*.
phosphate, 27*A*.
phosphate, for food containers, 83*A*.
phosphate, Russian practice, 83*A*.
plastic, 133*A*.
protective, corrosion-resistance, 68*A*.
tin, fusion, 27*A*.
tin-lead, thickness determination, 160*A*.
varnish, for steel cartridge cases, 133*A*.
wear-resistant, Parco Lubrizing process, 27*A*.
zinc, effect of copper, 26*A*.
zinc, passivation, Cronak process, 25*A*.
zinc, passivation, Passival process, 25*A*.
zinc, passivation, Rushtol Passivation "A" process, 25*A*.
Cobalt, determination in high-speed steel, photometric method, 68*A*.
Cobalt Alloys, scaling, 60*A*.
Cobalt Steel, tempering of, 60*A*.
Cogging Mills, 14*A*.
for alloy steel, 14*A*.
Cohesive Strength :
metals, 155*A*.
technical, metals at low temperatures, 84*A*.
Coke :
combustion, 73*A*.
foundry, properties, effect on cupola operation, 94*A*.
Coke Oven Gas :
determination of hydrocyanic acid, 117*A*.
induction burners for, 120*A*.
for inflating blast-furnace gas mains, 42*A*.
sulphur recovery, 2*A*.
sulphur recovery, Thylox process, 3*A*.
uses, 41*A*., 144*A*.
Coke Ovens, Koppers, 2*A*.
Coking, swelling pressure of coal, measurement, 72*A*., 73*A*.
Coking Industries :
Belgium, 93*A*.
France, 93*A*.
Holland, 93*A*.
Coking Plant, Kaiser Co., Inc., 2*A*.
Coking Properties, coal, 2*A*., 120*A*., 144*A*.
Coking Tests, coal, 93*A*.
Cold-Roll Forming, 15*A*.
Cold-Rolled Iron, annealing, 57*A*.
Cold Rolling :
effect on iron alloys, strain hardening, 57*A*.
effect on manganese steel, structure, 62*A*.
Cold-Work, effect on Armco iron wire, 181*P*.
Cold Working, spring steel, 152*A*.
Combustion :
coke, 73*A*.
open-hearth furnaces, 99*A*.
Combustion Products, from gaseous fuel, 144*A*.
Concentration, iron ore, low-grade, methods of increasing iron recovery, 39*A*.
Concrete, blast-furnace slag, abrasion, 73*A*.
Conductivity :
thermal, determination, 41*A*.
thermal, refractory materials, 118*A*.
Control :
atmospheres in reheating furnaces, 12*A*.
electronic, 103*A*.
electronic, heat treatment furnaces, 17*A*.
gas-supply systems, 72*A*.
moisture in blast-furnaces, 93*A*.
production in steel foundries, 6*A*.
quality, in foundries, 8*A*., 74*A*.
rolling mills, Metadyne system, 126*A*.
slag in open-hearth practice, 47*A*., 100*A*.
speed of wire-drawing machinery, 77*A*.
temperature, 152*A*.
Control Instruments :
maintenance, 46*A*.
for open-hearth furnaces, 99*A*.
Control Methods, physical, for steel plants, 148*A*.
Converters :
Bessemer, refractory materials for, 143*A*.
side-blown, reactions, 9*A*., 148*A*.
Conveyors, for foundries, 98*A*.
Cooling Rate, welds, 80*A*.
Copper :
effect in zinc coatings, 26*A*.
electrodeposition, 130*A*.
properties, effect of preferred orientation, 157*A*.
Copper Brazing, steel, 80*A*.
Copper-Nickel-Phosphorus Steel, stress relief, effect of time and temperature, 105*A*.
Copper Steel, intercrystalline corrosion, 114*A*.
Cores, use of granulated slag, 6*A*.
Corrosion :
chemical engineering equipment, 89*A*.
electrolytic, principles, 35*A*.
food containers, 115*A*.

Corrosion (*contd.*)—
galvanised coatings in water, 67*A*.
galvanised steel wire, 67*A*.
intercrystalline, copper steel, 114*A*.
iron in electrolytes, 66*A*.
mechanism, 68*A*.
metals in soil, 141*A*.
nitrided steel in moist oxygen, 67*A*.
non-ferrous metals, effect of oil emulsions, 121*P*.
pipes, 89*A*.
prevention by use of wrapping material, 68*A*., 116*A*.
pumps in acid-bearing waters, 159*A*.
salt-bath pots, by molten nitrates, 71 *Paper*.
steel by steam, 35*A*.
stress, alloys, 112*A*.
water tanks, 67*A*.
zinc in water, 67*A*.
Corrosion Cracking :
stress, aluminium alloys, 113*A*.
stress, carbon steel, 113*A*.
stress, chromium steel, 113*A*.
stress, stainless steel, 89*A*., 112*A*., 113*A*.
stress, wire, 141*A*.
Corrosion Inhibitors, use of oil emulsions, 109 *Paper*.
Corrosion Resistance :
metals, 88*A*.
metals to chemical attack, 89*A*.
Corrosion-Resistant Steel, development, 111*A*.
Corrosion Studies at Cambridge University, 88*A*.
Corrosion Tests :
humidity cabinet for, 36*A*.
total-immersion, 88*A*.
Costs, basic electric steel, 10*A*.
Council Report, 19*P*.
Cracking :
boilers, 58*A*.
chromium-nickel steel tubes, 57*A*.
corrosion, copper steel, 114*A*.
stress-corrosion, aluminium alloys, 113*A*.
stress-corrosion, carbon steel, 113*A*.
stress-corrosion, chromium steel, 113*A*.
stress-corrosion, stainless steel, 89*A*., 112*A*., 113*A*.
stress-corrosion, wire, 141*A*.
Cracks :
detection, magnetic powder method, 31*A*., 59*A*., 137*A*., 156*A*., 157*A*.
detection, Reynolds equipment, 31*A*.
detection, use of fluorescent solution, 85*A*.
in die shanks, 151*A*.
in ingots, 11*A*.
in welds, 21*A*.
see also Defects.
Crane Co., foundry plant, 8*A*.
Cranes, electric motor for, 125*A*.
Crankshafts, marine-engine, forging, 77*A*.
Creep :
heat-resistant steel, 137*A*.
metals, plotting of results, 85*A*.
Creep Tests :
interpretation of data, 87*A*.
metals, 87*A*.
Cromol Cast Iron, 94*A*.
Crystal Structure, X-ray, 64*A*.
Crystals :
orientation in sheets, 112*A*.
preferred orientation, effect on deep drawing, 157*A*.
Cupola Iron, use in open-hearth furnaces, 100*A*.
Cupola Practice, 44*A*.
Cupola Slag, granulated, use for core sand, 6*A*.
Cupolas :
basic, operation, 44*A*.
effect of coke properties, 94*A*.
raw materials for, 44*A*.
reactions, 94*A*.
Cupping Tests :
for determining drawability, 13*A*.
see also Deep-Drawing Tests.
Cutting :
flame, under water, 22*A*., 53*A*.
oxy-acetylene, 108*A*., 129*A*.
Cutting Capacity :
high-speed steel, effect of elements, 106*A*.
high-speed steel, effect of hardening, 106*A*.
Cutting Fluids, selection and use, 109*A*.
Cutting Properties, high-speed steel, 23*A*.
Cutting Speeds, super-high, use in machining, 23*A*.
Cutting Tools, arc-deposited alloys for, 108*A*.
Cyanide Hardening, 16*A*.
Cylinder Liners :
centrifugal casting, 45*A*.
lining with boron cast iron by centrifugal methods, 7*A*.

Damping, metals, 135*A*.
Damping Capacity :
iron-nickel alloys, 28*A*.
steel, effect of heat treatment, 45 *Paper*.
Davis Plastometer for measuring plasticity of coal, 72*A*.
De Lattre Pickling Process, 24*A*.
Decarburisation, rate of, in basic open-hearth practice, 10*A*.
Deep Drawing, 13*A*.
effect of preferred orientation, 157*A*.
oil-sump pans, 125*A*.
Deep-Drawing Tests, 85*A*.
Erichsen, 109*A*.
K.W.I., 109*A*.
Persoz and Jovignot, 109*A*.
Deere and Co., foundry plant, 8*A*.
Defects :
detection, magnetic powder method, 46*A*.
in ingots, blooms and billets, 103*A*.
in steel castings, 46*A*.
surface, on ingots and billets, 48*A*.
see also Cracks.
Deformation :
crystallite, at surface of stressed parts, 29*A*.
metals, 135*A*.
plastic, 29*A*.

Deoxidation :
effect on steel, strain-age embrittlement, 55*A*.
steel, 100*A*.
Dephosphorisation, mechanism, 505*P*.
Desulphurisation, cast iron, soda-ash method, 5*A*.
Detearing, paint coatings, 84*A*.
Diamond Powder, use for wire-drawing dies, 49*A*.
Diatomaceous Earth, *see* Refractory Materials.
Diatomite, *see* Refractory Materials.
Die Casting, 7*A*.
Die-Shanks, cracking, 151*A*.
Die Steel, properties, 88*A*.
Dies :
carbide, polishing, 14*A*.
forging, 102*A*.
forging, design, 13*A*., 77*A*.
tungsten-carbide, development, 77*A*.
wire-drawing, 102*A*.
wire-drawing, use of diamond powders, 49*A*.
Diesel Engine Parts, Meehanite castings compared with welded steel, 81*A*.
Dominion Foundries and Steel, Ltd., plant, 6*A*.
Drawability, steel, determination, 13*A*.
Drawing :
deep, 13*A*.
deep, effect of preferred orientation, 157*A*.
deep, oil-sump pans, 125*A*.
enamelled steel, 158*A*.
manganese-steel wire, 13*A*.
steel cartridge cases, 12*A*.
wire, 13*A*.
wire, calculation charts, 49*A*.
wire, calculation of reduction in area, 13*A*.
wire, lubricating compounds, 49*A*.
wire, reactive, 151*A*.
Drawing Dies :
tungsten-carbide, development, 77*A*.
for wire, 102*A*.
for wire, use of diamond powders, 49*A*.
Drawing Machines, wire, electrical equipment for, 49*A*.
Drawing Tests :
deep, 85*A*.
wedge, 136*A*.
Drills, twist, roll-forging, 151*A*.
Drop Forging, 102*A*.
Drying :
foundry ladles, 122*A*.
moulds, use of town gas, 146*A*.
Du Pont de Nemours & Co., halogen electrolyte, 27*A*.
Durham, coal seams, 118*A*.
Dust :
collecting systems, 24*A*.
in steel foundries, 123*A*.
Dust Catchers, cyclone, 121*A*.

Eberbach Microhardness Testing Machine, 58*A*.
Ecco Method for coating wire, 130*A*.
Ekelund Formula for calculating spread in rolling, 14*A*.
Elastic Modulus, iron-nickel alloys, 28*A*.
Electric Furnace Practice :
acid, 101*A*., 148*A*.
compared with open-hearth practice, 76*A*.
Electric Furnace Slag, basic, constitution, 395*P*.
Electric Furnaces :
arc, furnace atmospheres, effect on hydrogen and nitrogen in steel, 48*A*.
basic, production of alloy steel, 47*A*.
electrodes, efficient use, 10*A*.
electrodes, types used, 11*A*.
high-frequency, for foundries, 124*A*.
manufacture of alloy steel, 74*A*.
manufacture of ferro-alloys, 74*A*.
production of cast iron, 95*A*.
refractory materials for, 71*A*.
rocking resistor, 95*A*.
Siemens-Halske, 11*A*.
Electric Power :
circuit breakers, 126*A*.
Niagara district, 94*A*.
Electric Smelting, iron ore, 4*A*., 10*A*.
Electric Steel :
basic, costs, 10*A*.
basic, production, 10*A*.
Electrical Equipment for wire-drawing machines, 49*A*.
Electrical Plant, maintenance, 47*A*.
Electrodeposited Coatings :
specifications, 82*A*.
on wire, Ecco method, 130*A*.
Electrodeposition :
for building up worn parts, 26*A*.
cadmium, 130*A*.
chromium, 82*A*., 130*A*.
copper, 130*A*.
lead, 83*A*.
metals, principles, 130*A*.
nickel, 130*A*., 131*A*.
selective, 25*A*.
silver, 130*A*., 132*A*.
tin, 130*A*.
zinc, 130*A*.
Electrodes :
electric-furnace, efficient use, 10*A*.
electric-furnace, types used, 11*A*.
for hard surfacing, 80*A*.
welding, 21*A*.
welding, aluminium, 80*A*.
welding, boron treated, 53*A*.
welding, cast iron, 80*A*.
welding, coated, properties, 21*A*.
welding, copper, 80*A*.
welding, determination of moisture in coatings, 129*A*.
welding, metallic arc, 80*A*.
welding, nickel, 80*A*.
welding, stainless steel, 80*A*.
Electrogalvanising, 26*A*., 83*A*., 131*A*.
Hanson Van Winkle Munning Co. process, 26*A*.
Hubbell-Weisberg process, 26*A*.
Electrolyte :
corrosion of iron, 66*A*.
halogen, developed by Du Pont de Nemours and Co., 27*A*.

Electrolytic Corrosion, principles, 35*A*.
Electrolytic Manganese, production, 74*A*.
Electronic Control, 103*A*.
heat-treatment furnaces, 17*A*.
Electrotinning, 131*A*.
strip, 27*A*.
Embrittlement :
heat, alloy steel, 137*A*.
steel, 55*A*.
strain-age, steel, effect of deoxidation with silicon, aluminium and titanium, 55*A*.
Enamel, porcelain, properties, 132*A*.
Enamel Coatings, adherence, 132*A*.
Enamel Frits, properties, 133*A*.
Enamel Slips, fineness and consistency, 132*A*.
Enamelled Steel, drawing properties, 158*A*.
Enamelling, porcelain, preparation of metal surfaces, 132*A*.
End-Quench Test, *see* Jominy Hardenability Test.
Endurance Limit, relation to indentation hardness, 86*A*.
Endurance Strength, impact, case-hardened steel, effect of coatings, 85*A*.
Energy Consumption, in hot rolling, 50*A*.
Engine Parts, hardening, 106*A*.
Erichsen, deep drawing test, 109*A*.
Etching :
lead-bearing steel, 285*P*.
metallographic specimens, 111*A*.
Expansion, pure iron, interferometer measurements, 60*A*.
Extensometer, precision, 28*A*.
Exudation Test, for determining segregation in lead-bearing steel, 283*P*.

Failure :
aircraft engine parts, 156*A*.
chromium-nickel-steel tubes, 57*A*.
gudgeon pins, 137*A*.
springs, 58*A*.
wire ropes, 57*A*.
Fairchild Engine and Aircraft Corp., process for bonding cooling fins to engine cylinders, 53*A*.
Fatigue :
carbon-steel plates, effect of heating, 107*A*.
chromium-molybdenum-nickel steel, 110*A*.
effect of metallurgical notch, 29*A*.
effect of screw threads, 58*A*.
effect of shot peening, 110*A*.
shafts, 110*A*.
Fatigue Strength :
cast iron, 54*A*.
chromium-cobalt-nickel alloys, 29*A*.
effect of hard surfaces, 157*A*.
effect of size of specimen, 86*A*.
gear wheels, methods of improving, 29*A*.
iron-chromium-cobalt alloys, 29*A*.
Fatigue Testing Machines, Avery, 157*A*.
Fatigue Tests, 137*A*.
effect of overstressing and understressing, 85*A*.
Feeder Heads for steel castings, 329*P*.
Feeding, steel castings, 329*P*.
Feeding Compounds, for steel castings, 329*P*.
Ferrite, diffusion rate of molybdenum, 66*A*.
Ferro-Alloys :
manufacture in electric furnaces, 74*A*.
nitriding, 74*A*.
Fibre, effect on chromium-nickel steel, tensile strength, 55*A*.
Films :
oxide, formation, 141*A*.
oxide, iron-aluminium-chromium alloys, 115*A*.
Firebricks, *see* Refractory Materials.
Fireclay, *see* Refractory Materials.
Fischer-Tropsch Process of oil production, 42*A*.
Flakes, in alloy steel, 100*A*.
Flame Gases, abnormality, 93*A*.
Flame Radiation in open-hearth furnaces, 99*A*.
Flow, metals, 155*A*., 156*A*.
Fluorescent Solution, use for detection of cracks, 85*A*.
Fluorine, determination in coal, 117*A*.
Fluorspar, aluminium dross as a substitute for, 100*A*.
Fluxes, for galvanising baths, 82*A*.
Fly Wheels, moulding, 146*A*.
Food Containers :
durability, 27*A*.
hydrogen swells, 115*A*.
production in America, 132*A*.
use of phosphate and lacquer coatings, 83*A*.
Forge Furnace, 102*A*.
pulverised-coal-fired, 41*A*.
Forgeability, steel, determination by twist tests, 13*A*.
Forging :
aircraft engine parts, 150*A*.
bomb cases, 151*A*.
drop, 102*A*.
gap-mill process, 151*A*.
high-speed steel, 102*A*.
" one-shot " method, 102*A*.
roll-, twist drills, 151*A*.
shells, 12*A*., 13*A*., 77*A*.
shells, dies for, 102*A*.
Forging Dies, 102*A*.
design, 13*A*., 77*A*.
Forging Machines, layout in relation to hot saws, 77*A*.
Forgings :
magnetic powder tests, 156*A*.
properties, 125*A*.
Foundries :
compressed-air supply, 75*A*.
conveyors, 98*A*.
high-frequency furnaces, 124*A*.
maintenance, 147*A*.
mechanisation, 124*A*.
quality control, 8*A*., 74*A*.
silicosis, 97*A*.
steel, production control, 6*A*.
ventilation, 9*A*.
Foundry :
co-operation with machine shop, 8*A*.
steel, dust in, 123*A*.

Foundry Coke, properties, effect on cupola operation, 94*A*.
Foundry Cores, *see* Cores.
Foundry Plant :
Crane Co., 8*A*.
Deere and Co., 8*A*.
Dominion Foundries and Steel, Ltd., 6*A*.
Grinnell Co. of Canada, Ltd., 75*A*.
Midland Motor Cylinder Co., Ltd., 8*A*.
Oklahoma Steel Castings Co., 6*A*.
Westinghouse Electric & Mfg. Co., 124*A*.
Foundry Practice, 5*A*., 44*A*., 74*A*., 94*A*., 122*A*., 145*A*.
Foundry Sand, *see* Moulding Sand.
Fractography, 63*A*.
Fracture :
metals, 155*A*.
steel, 134*A*., 156*A*.
France, coking industry, 93*A*.
Free-Cutting Steel, lead-bearing, segregation, 273 *Paper*.
Fretz-Moon Process of pipe production, 50*A*.
Friction, cast iron against chromium-plated steel, 31*A*.
Fuel, 2*A*., 41*A*., 72*A*., 93*A*., 120*A*., 144*A*.
pulverised, *see* Coal, pulverised.
solid, reactivity, 72*A*.
Furnace Atmospheres :
lithium treated, 153*A*.
moisture content, 2*A*.
Furnace Walls, flow of coal-ash slag, 144*A*.
Furnaces :
blast, *see* Blast-Furnaces.
controlled atmospheres, production, 78*A*.
controlled atmospheres, use of lithium, 78*A*.
electric, *see* Electric Furnaces.
forge, *see* Forge Furnaces.
heat losses and gas consumption, 144*A*.
heat-treatment, *see* Heat-Treatment Furnaces.
insulation, 92*A*., 143*A*.
malleable iron, *see* Malleable Iron Furnaces.
open-hearth, *see* Open-Hearth Furnaces.
reheating, *see* Reheating Furnaces *and* Soaking Pits.

Galv-Weld Alloy, 27*A*.
Galvanised Coatings :
corrosion in water, 67*A*.
pliable, 131*A*.
Galvanised Steel, tensile tests at high temperatures, 112*A*.
Galvanised Steel Wire, corrosion, 67*A*.
Galvanised Welded Joints, regalvanising, 27*A*.
Galvanising :
effect of copper in zinc bath, 26*A*.
electro-, 83*A*., 131*A*.
electro, Hanson Van Winkle Munning Co. process, 26*A*.
electro, Hubbell-Weisberg process, 26*A*.
lead-zinc process, 26*A*.
sheets, effect of carbon content of steel, 26*A*.
Galvanising Baths :
addition of aluminium, 82*A*.
fluxes for, 82*A*.
Galvanising Process, 26*A*.
Ganister, *see* Refractory Materials.
Gap-Mill Forging Process, 151*A*.
Gas :
blast-furnace, *see* Blast-Furnace Gas.
coke-oven, *see* Coke-Oven Gas.
distributing system for steel plants, 2*A*.
town, use for drying moulds, 146*A*.
Gas Burners, design, 2*A*.
Gas Engines, lubrication, 14*A*.
Gas Holders, purging, 121*A*.
Gas Producers, *see* Producers.
Gas-Supply Systems, control, 72*A*.
Gaseous Fuel :
combustion products, 144*A*.
in furnaces, 144*A*.
Gases :
in cast iron, 122*A*.
dissolved, effect on casting structure, 100*A*.
evolved from moulds, 45*A*.
flame, abnormality, 93*A*.
hydrocarbon, effect on refractory materials, 1*A*.
in steel, 100*A*.
Gauge :
strain, acoustic, 134*A*.
strain, rosette, 134*A*.
Gear Wheels, fatigue strength, methods of improving, 29*A*.
Gears :
case-hardening, 17*A*.
shaving of teeth before heat treatment, 23*A*.
surface-hardening, 17*A*.
General Electric Co., control system for screw downs, 103*A*.
General Electric X-Ray Corp., X-ray equipment, 33*A*.
Germany :
labour problems, 15*A*.
specifications for tests of moulding sand, 45*A*.
standard blast-furnaces, 3*A*.
Gieseler Plastometer for measuring plasticity of coal, 72*A*., 73*A*.
Girders, welded, stress relief, 21*A*.
Glass, molten, use for treatment of wire, 14*A*.
Gödel Moulding Process, 75*A*.
Grain Growth, effect of grain shape, 63*A*.
Grain Size :
effect on cast steel, hardenability, 30*A*.
high-speed steel, effect of hardening temperature, 109*A*.
Granite City Steel Co., plant, 46*A*.
Granular Material, heat flow, 119*A*.
Granulation, cupola slag, 6*A*.
Graphite :
effect in malleable cast iron, tensile strength, 55*A*.
use in open-hearth charges, 76*A*.
Graphitisation :
carbon steel at sub-critical temperatures, 57*A*.
molybdenum steel tubes, 156*A*.

Great Lakes Steel Corporation :
bar mills, 103*A*.
fuel-distributing system, 2*A*.
roll design for bar mills, 103*A*.
Grinding Mills, wear of balls, 30*A*.
Grinnell Co. of Canada, Ltd., foundry practice, 75*A*.
Gudgeon Pins, failure, 137*A*.
Gummix, 100*A*.
Gypsum Cement, use for patterns, 97*A*.

Hallamshire Steel and File Co., heat-treatment plant, 78*A*., 128*A*.
Hanson Van Winkle Munning Co. :
electrogalvanising Process, 26*A*.
pickling process, 24*A*.
Hard-Surfacing, 19*A*.
electrodes for, 80*A*.
Hardenability :
air, steel, 59*A*.
alloy steel, 33*A*., 86*A*.
alloy steel, effect of carbon, 59*A*.
automobile steel, 87*A*.
cast steel, 30*A*., 110*A*.
cast steel, effect of grain size, 30*A*.
chromium-molybdenum-nickel steel, 65*A*.
intensifiers, 100*A*.
manganese-molybdenum steel, 30*A*.
National Emergency steel, effect of alloying elements, 28*A*.
steel, 30*A*.
steel, effect of chromium, 59*A*.
steel, effect of molybdenum, 66*A*.
steel, effect of nickel, 59*A*.
Hardenability Band, determination, 87*A*.
Hardenability Tests :
Jominy, 30*A*., 58*A*., 86*A*., 110*A*.
Jominy, cast steel, 30*A*.
for shallow-hardening steel, 59*A*.
Hardened High-Speed Steel, nitriding, 18*A*.
Hardened Steel, nitriding, 51*A*.
Hardening :
cyanide, 16*A*.
effect on high-speed steel, cutting capacity, 106*A*.
engine parts, 106*A*.
flame, 17*A*.
high-speed steel, pretreatment in salt baths, 50*A*.
induction, 79*A*., 104*A*.
induction, Bren gun parts, 52*A*.
induction, effect on steel, 32*A*.
induction, Megatherm unit, 79*A*.
induction, needles, 18*A*.
induction, steel, 52*A*.
strain, iron alloys during cold rolling, 57*A*.
surface, gears, 17*A*.
work-, Armco iron, 181 *Paper*.
Hardening Temperature, effect on high-speed steel, grain size, 109*A*.
Hardness :
cast iron, quenched, effect of phosphorus, 87*A*.
indentation, relation to other properties, 86*A*.
Hardness Testing Machines :
Bierbaum, 86*A*.
micro-, 86*A*.
micro-, Eberbach, 58*A*.
micro-, Tukon, 58*A*.
Hardness Tests :
at high temperatures, 30*A*.
indentation, 86*A*.
magnetic, 30*A*.
Heat :
flow through granular material, 119*A*.
specific, chromite at low temperatures, 71*A*.
Heat Content, chromite at high temperatures, 71*A*.
Heat Embrittlement, alloy steel, 137*A*.
Heat Energy Input, welds, 80*A*.
Heat Losses, furnaces, 144*A*.
Heat-Resistant Steel :
creep, 137*A*.
development, 111*A*.
Heat-Transfer :
flame to bath in open-hearth furnaces, 99*A*.
in moulds, 147*A*.
regenerators, calculation, 41*A*.
water-cooling systems, effect of oil-emulsion treatment, 125*P*.
Heat Transmission :
calculations, 41*A*.
moulding sand, 6*A*.
Heat Treatment, 15*A*., 50*A*., 78*A*., 104*A*., 127*A*., 152*A*.
automobile parts, 152*A*.
broaches, 51*A*.
cast steel, 106*A*.
chromium ball-race steel, 18*A*.
effect on carbon steel, charts showing, 78*A*.
effect on cast steel 64*A*.
effect on steel, damping capacity at low stresses, 45 *Paper*.
effect on welded alloy steel, 107*A*.
hair springs, 51*A*.
holding time, 152*A*.
isothermal, 16*A*.
isothermal, alloy steel, 127*A*.
leaf springs, 78*A*.
machine gun links, 19*A*.
molybdenum-nickel steel, carburised, 18*A*.
shells, 78*A*.
steel, theory, 15*A*.
tank-track spindles, 153*A*.
tank turret rings, 18*A*.
Heat Treatment Furnaces :
conveyor belts for, 51*A*.
electronic control, 17*A*.
loading equipment, 153*A*.
producer-gas-fired, 3*A*., 128*A*.
pulverised-coal-fired, 41*A*.
roller-hearth type, magnetic device for, 128*A*.
Heating :
effect on carbon-steel plates, fatigue, 107*A*.
induction, 13*A*., 17*A*., 18*A*., 77*A*., 79*A*., 104*A*., 105*A*., 128*A*.
induction, low frequency, 81*A*.

Heating (*cont.*)—
induction, Megacycle system, 17*A*.
induction, principles, 153*A*.
induction, for shrink fits, 19*A*.
induction, steel cartridge cases, 153*A*.
induction, Tocco process, 153*A*.
resistance, salt baths for patenting of wire, 104*A*.
steel ingots, rate of, 12*A*.
Helium Shielded-arc Welding Process, 108*A*.
High-Frequency Furnaces, *see* Electric Furnaces.
High-Speed Steel :
brazing, 22*A*.
cutting capacity, effect of elements, 106*A*.
cutting capacity, effect of hardening, 106*A*.
cutting capacity, increase of, 54*A*.
cutting properties, 23*A*.
determination of cobalt, photometric method, 68*A*.
double tempering, 106*A*.
effect of refrigeration, 109*A*.
forging, 102*A*.
grain size, effect of hardening temperature, 109*A*.
hardened, nitriding, 18*A*.
low-temperature treatment, 19*A*., 65*A*., 79*A*., 154*A*.
nitriding, 51*A*., 79*A*., 105*A*.
transformation under pressure, 35*A*.
treatment in salt bath prior to hardening, 50*A*.
welding, low-temperature, 53*A*.
Hoganäs Sponge Iron Process, 4*A*.
Holden Hy-Speed Case Process of nitriding, 105*A*.
Holding Time, in heat treatment, 152*A*.
Holland, coking industry, 93*A*.
Honing, liquid, 130*A*.
Houdaille-Hershey Corp., heat-treatment plant, 78*A*.
Hubbell-Weisberg Process of electrogalvanising, 26*A*.
Humidity Cabinet, for corrosion tests, 36*A*.
Hydro-Blast, use for cleaning castings, 98*A*.
Hydrocarbon Gases, effect on refractory materials, 1*A*.
Hydrocyanic Acid, determination in coke-oven gas, 117*A*.
Hydrogen :
behaviour in open-hearth process, 99*A*.
determination in iron and steel, 100*A*., 160*A*.
determination in liquid steel, 160*A*.
in electric steel, effect of furnace atmosphere, 48*A*.
equilibrium pressure in iron, 110*A*.
Hydrogen Swells, in food containers, 115*A*.
Hydrogenation, coal, 144*A*.

Ihrigising Process, 78*A*.
Impact Strength :
case-hardened steel, effect of coatings, 85*A*.
low-alloy steel, 85*A*.
Impact Tests :
case-hardened steel, 84*A*.
notched-bar, variables affecting results, 29*A*.
structural steel, for determination of weldability, 85*A*.
Inclusions, lead-bearing steel, 277 *Paper*.
Induction Hardening, 104*A*.
Bren gun parts, 52*A*.
effect on steel, 32*A*.
Megatherm unit, 79*A*.
needles, 18*A*.
steel, 52*A*.
Induction Heating, 13*A*., 17*A*., 18*A*., 77*A*., 79*A*., 104*A*., 105*A*., 128*A*.
low-frequency, 81*A*.
Megacycle system, 17*A*.
principles, 153*A*.
for shrink fits, 19*A*.
steel cartridge cases, 153*A*.
Tocco process, 153*A*.
Inglis, John & Co., Ltd., chromium plating process, 131*A*.
Ingot Iron, inclusions, 277*P*.
Ingot Moulds :
life, 101*A*., 125*A*.
use of carbon inserts, 150*A*.
Ingots :
anti-piping compounds, 41*A*.
cracks, 11*A*.
defects in, 103*A*.
defects, surface, 48*A*.
delivery to rolling mills, 99*A*.
lead-bearing steel, segregation, 273 *Paper*.
rate of heating, 12*A*.
reheating furnaces, 12*A*., 102*A*.
segregation, 48*A*.
solidification, 125*A*.
tipper for, 50*A*.
Inhibitors, use in pickling, 24*A*.
Inoculation, cast iron, 5*A*., 94*A*., 145*A*.
Insulating Bricks, production, 92*A*.
Insulating Materials, 40*A*.
behaviour under stress at high temperatures, 92*A*.
Insulation :
blast furnaces, 143*A*.
furnaces, 92*A*., 143*A*.
open-hearth furnaces, 143*A*.
theory, 71*A*.
Internal Combustion Engines, valve steels for, 32*A*.
Iron :
cold-rolled, annealing, 57*A*.
corrosion in electrolytes, 66*A*.
hydrogen equilibrium pressure, 110*A*.
production, 3*A*., 42*A*., 73*A*., 93*A*., 121*A*.
pure, expansion, interferometer measurements, 60*A*.
recrystallisation after hot-deformation, 135*A*.
silicon, barley-shell structure, 105 *Paper*.
Iron Alloys :
binary, systematics, 140*A*.
strain hardening during cold rolling, 57*A*.
transformations, 140*A*.

Iron-Aluminium-Chromium Alloys :
oxidation of aluminium, 115*A*.
oxide films, 115*A*.
Iron Carbide, in steel, 112*A*.
Iron-Chromium Alloys, strain hardening during cold rolling, 57*A*.
Iron-Chromium-Cobalt Alloys, fatigue strength, 29*A*.
Iron-Cobalt Alloys :
magnetic properties, 157*A*.
strain hardening during cold rolling, 57*A*.
Iron-Cobalt-Tungsten Alloys, transformations, effect of chromium, 66*A*.
Iron Industries :
Russia, 46*A*.
South Wales, effect of war-time conditions, 147*A*.
Sweden, 121*A*.
United Kingdom, re-organisation, 9*A*.
Iron-Iron-Sulphide-Iron-Boride System, 140*A*.
Iron-Manganese Alloys, strain hardening during cold rolling, 57*A*.
Iron-Molybdenum Alloys :
diffusion of molybdenum, 66*A*.
strain hardening during cold rolling, 57*A*.
Iron-Nickel Alloys :
damping capacity, 28*A*.
elastic modulus, 28*A*.
strain hardening during cold rolling, 57*A*.
Iron Ore :
electric smelting, 4*A*., 10*A*.
frozen, thawing chamber for, 40*A*.
Krivoi-Rog, smelting, 3*A*.
low-grade, concentration, methods of increasing iron recovery, 39*A*.
magnetic separator, Memco-Hoster, 39*A*.
nodulising, 100*A*.
preparation, behaviour of vanadium, 39*A*.
preparation, treatment of slimes, 91*A*.
sintered, use in blast-furnaces, 43*A*.
sintering plants, standardisation, 91*A*.
sintering plant, Wheeling Steel Corp., 91*A*.
vanadium in, 39*A*.
Iron Ore Deposits :
Mexico, 118*A*.
New Mexico, manganiferous, 39*A*.
Russia, 118*A*.
Sweden, 39*A*.
Iron Powders, *see* Powdered Iron.
Iron-Silicon Alloys :
cleavage structure, 63*A*.
strain-hardening during cold rolling, 57*A*.
Iron Sponge, *see* Sponge Iron.
Isothermal Heat-Treatment, alloy steel, 127*A*.
Isothermal Quenching, 19*A*., 51*A*., 106*A*.
Isothermal Transformation :
chromium-molybdenum-nickel steel, 79*P*., 96*P*.
steel, 133 *Paper*.
Isothermal Transformation Diagrams, 65*A*.
Jessop Steel Co., laboratory, 32*A*., 62*A*.
Jominy Hardenability Tests, 30*A*., 58*A*., 59*A*., 86*A*., 110*A*.
cast steel, 30*A*.
Jones and Laughlin Steel Corp. :
electrotinning plant, 131*A*.
strip mills, 103*A*.

Kaiser Co., Inc. :
coal-treatment plant, 2*A*.
coking plant, 2*A*.
Fontana plant, 40*A*.
steel plant, 10*A*.
Kolene Process of tinning cast iron, 83*A*.
Koppers Coke Oven, 2*A*.
Kraft Paper, for wrapping steel parts, 68*A*.
Krause Rolling Mill, 104*A*.
Krivoi-Rog Ore, smelting, 3*A*.
Krupkowski and Balicki's Theory of recrystallisation, 217*P*.
K.W.I. Deep-Drawing Test, 109*A*.

Laboratories :
Jessop Steel Co., 32*A*., 62*A*.
spectrographic, Allis-Chalmers Manufacturing Co., 161*A*.
Lacquer Coatings for food containers, 83*A*.
Ladle Nozzles :
Bagnall-Bethel, 100*A*.
refractory materials for, 143*A*.
Ladles :
foundry, design, 75*A*.
foundry, drying, 122*A*.
X-ray examination of stoppers, 47*A*.
Lead, electrodeposition, 83*A*.
Lead-Bearing Steel :
etching, 285*P*.
inclusions, 277 *Paper*.
machinability, 54*A*.
mode of occurrence of lead, 281 *Paper*.
segregation, determination by exudation test, 283*P*.
Lead-Bearing Steel Ingots, segregation, 273 *Paper*.
Lead-Coated Steel :
properties, 83*A*.
soldering, 132*A*.
Lead Coatings on Steel, 132*A*.
Lead Prints :
for detection of lead in steel and brass, 101*A*.
production, 286*P*.
Lead-Zinc Process of galvanising, 26*A*.
Leyensetter Pendulum Apparatus, use in machinability tests, 54*A*.
Lighting of steel plants, 150*A*.
Lime/Magnesia/Silica/Alumina System, 398*P*.
Linings :
blast-furnace, failure, 119*A*.
converter, 143*A*.
open-hearth furnace, maintenance, 100*A*.
open-hearth furnace, patching, 100*A*.
Liquid Honing, 130*A*.
Lithium, use in furnace atmospheres, 78*A*., 153*A*.

Lockheed Aircraft Corporation, fatigue testing machines, 137*A*.
Lost-Wax Process, for precision casting, 123*A*.
Lubricants :
properties, 14*A*.
for wire drawing, 49*A*.
Lubricating Grease, manufacture, 126*A*.
Lubrication :
gas engines, 11*A*.
rolling-mill bearings, 126*A*.
use of oil-water emulsions, 126*A*.

Machinability, lead-bearing steel, 54*A*.
Machinability Tests, use of Leyensetter pendulum apparatus, 54*A*.
Machine-Gun Links, heat treatment, 19*A*.
Machine Shop, co-operation with foundry, 8*A*.
Machine Tool Castings, requirements for engineers, 145*A*.
Machining :
steel, mechanics, 154*A*.
use of super-high cutting speeds, 23*A*.
Macro Examination, steel, 158*A*.
Magnesite, *see* Refractory Materials.
Magnesium Alloys, spot welding, 20*A*.
Magnetic Analysis, 64*A*.
Magnetic Powder Method :
of crack detection, 30*A*., 46*A*., 59*A*., 137*A*., 156*A*., 157*A*.
of crack detection, use of organic coatings, 59*A*.
Magnetic Properties, iron-cobalt alloys, 157*A*.
Magnetic Separation, iron from scrap, 91*A*.
Magnetic Separator, Memco-Hoster, 39*A*.
Magnetic Sorting Bridge, 60*A*.
Magnetic Tests, 157*A*.
Magnets, permanent, applications, 60*A*.
Magnitogorsk, blast-furnace plant, 93*A*.
Maintenance :
control instruments, 46*A*.
electrical plant, 47*A*.
steel plants, 46*A*.
Malleable Cast Iron :
analysis, 160*A*.
production, calculation of mixtures, 95*A*.
production and uses, 45*A*.
solidification, 95*A*.
tensile strength, effect of constituents, 55*A*.
whiteheart, use for tank-track links, 6*A*.
Malleable Iron Castings, gating and heading, 146*A*.
Malleable Iron Furnaces, pulverised-coal-fired, 95*A*.
Manganese, electrolytic production, 74*A*.
Manganese-Molybdenum Steel, hardenability, 30*A*.
Manganese Oxide/Alumina/Silica System, viscosity determination, 124*A*.
Manganese-Silicon Steel, cold-working and forming, 152*A*.
Manganese-Silicon-Zirconium Alloy, for inoculation of cast iron, 145*A*.
Manganese Steel :
stress relief, effect of time and temperature, 105*A*.
structure, effect of cold-rolling, 62*A*.
weldability, 107*A*.
Manganiferous Iron Ore Deposits, New Mexico, 39*A*.
Marine-Engine Crankshaft, forging, 77*A*.
Marine Growths, identification, 116*A*.
Martempering, 19*A*., 53*A*., 106*A*.
Martensite :
production, 133*P*.
tensile properties, 93*P*.
Maxi Nitriding Process, 105*A*.
Meehanite Castings, compared with welded steel, 81*A*.
Megacycle System of inducting heating, 17*A*.
Megatherm System of induction hardening, 79*A*.
Members, election, 7*P*.
Memco-Hoster Magnetic Separator, 39*A*.
Metadyne Control for rolling mills, 15*A*., 126*A*.
Metallographic Specimens, polishing and etching, 111*A*.
Metallography and Constitution, 33*A*., 62*A*., 111*A*., 139*A*., 158*A*.
Metallurgical Industry, economic factors, 46*A*.
Methane, effect on firebricks, 1*A*.
Mexico, iron ore deposits, 118*A*.
Microbalance, vacuum, for study of reactions, 139*A*.
Microhardness Testing Machines, 86*A*.
Microknife, 134*A*.
Microscopes, 62*A*.
electron, 111*A*., 139*A*.
electron, back-reflection and replica processes, 111*A*.
metallurgical, 111*A*.
Midland Ironworks, centenary, 44*A*.
Midland Motor Cylinder Co., Ltd. :
plant, 8*A*.
production of automobile castings, 94*A*.
Mineral Resources, 39*A*., 118*A*.
Mixers :
operation and maintenance, 100*A*.
recuperative, use of blast-furnace gas, 41*A*.
Moisture :
control in blast-furnaces, 93*A*.
in furnace atmospheres, 2*A*.
Molybdenum :
diffusion rate in austenite and ferrite, 66*A*.
effect in cast iron, 62*A*.
effect in chromium steel, 61*A*.
effect in high-speed steel, cutting capacity, 106*A*.
effect in steel, hardenability, 66*A*.
migration in steel, 66*A*.
Molybdenum-Nickel Cast Iron, use for punch tips, 12*A*.
Molybdenum-Nickel Steel, carburised, heat-treatment, 18*A*.
Molybdenum Steel, nitriding, 61*A*.
Molybdenum-Steel Tubes, graphitisation, 156*A*.

Molybdenum-Tungsten High-Speed Steel, low-temperature treatment, 65*A*.
Monikrom Cast Iron, 94*A*.
Montana, chrome ore deposits, 39*A*.
Morgan, George, Ltd., forging practice, 102*A*.
Mould Surfaces, properties at high temperatures, 96*A*.
Moulding :
flywheels, 146*A*.
use of sink heads, 98*A*.
Moulding Practice, 123*A*.
Moulding Sand :
in Australia, 123*A*.
compression strength at high temperatures, 145*A*.
dried, permeability, 75*A*.
heat transmission, 6*A*.
nature and properties of clay bond, 96*A*.
permeability, 96*A*., 146*A*.
ramming test, 145*A*.
tests, 75*A*.
tests, German standards, 45*A*.
use of cement, 75*A*., 97*A*.
Moulds :
drying, use of town gas, 146*A*.
gases evolved, 45*A*.
heat transfer, 147*A*.
Mullins Manufacturing Corp., manufacture of shells, 77*A*.

National Bureau of Standards, analytical samples, 117*A*.
National Emergency Steel :
applications, 32*A*.
composition, 31*A*.
fatigue, 110*A*.
hardenability, 65*A*.
hardenability, effect of alloying elements, 28*A*.
for oil-well drilling equipment, 62*A*.
properties, 32*A*., 87*A*., 158*A*.
tensile properties, effect of alloying elements, 28*A*.
Naval Construction, steels for, 32*A*., 88*A*.
Needles, induction hardening, 18*A*.
New Mexico, iron ore deposits, manganiferous, 39*A*.
Niagara District, electric power, 94*A*.
Nickel :
determination in iron and steel, colorimetric method, 68*A*.
effect in steel, hardenability, 59*A*.
electrodeposition, 130*A*., 131*A*.
Nickel Cast Iron, use for punch tips, 12*A*.
Nickel Steel, properties at low temperatures, 60*A*.
Niobium Steel, nitriding, 61*A*.
Nitrate Baths, for patenting wire, 13*A*.
Nitrates, molten, corrosion of salt-bath pots, 71 *Paper*.
Nitrided Steel :
corrosion in moist oxygen, 67*A*.
for gas-welding equipment, 67*A*.
structure, 128*A*.
Nitriding :
alloy steels for, 61*A*.
chromium-nickel steel, 105*A*.
Nitriding (*contd.*)—
chromium steel, 154*A*.
ferro-alloys, 74*A*.
hardened steel, 51*A*.
high-speed steel, 79*A*., 105*A*.
high-speed steel, hardened, 18*A*.
Holden Hy-Speed Case process, 105*A*.
Maxi process, 105*A*.
steel, 50*A*., 105*A*.
steel, effect of pre-heat treatment, 55 *Paper*.
Nitrogen :
determination in iron and steel, 99*A*.
determination in iron and steel, effect of annealing, 160*A*., 161*A*.
determination in iron and steel, Kempf-Abresch method, 161*A*.
determination in iron and steel, use of perchloric acid, 68*A*.
determination in steel, semi-micro method, 117*A*.
effect in stainless steel, 138*A*.
in electric steel, effect of furnace atmosphere, 48*A*.
segregation in steel, 99*A*.
Nodulising, iron ore, 100*A*.
Norris Stamping and Machining Co., production of steel cartridge cases, 150*A*.
Northumberland, coal seams, 118*A*.
Notch, metallurgical, effect in fatigue, 29*A*.
Notches, effect on chromium-nickel steel, tensile strength, 55*A*.
Nozzles, ladle, Bagnall-Bethel, 100*A*.

Ohio Steel Foundry Co., welding of steel castings, 108*A*.
Oil, production, Fischer-Tropsch process, 42*A*.
Oil Distillation Plants, cracking of tubes, 57*A*.
Oil Emulsions, use as corrosion inhibitors, 109 *Paper*.
Oil, Fuel, mixing with pulverised coal for heating open-hearth furnaces, 99*A*.
Oil-Sump Pans, deep drawing, 125*A*.
Oil-Well Drilling Equipment, steels for, 62*A*.
Oklahoma Steel Casting Co., plant, 6*A*.
Open-Hearth Foreman, qualifications, 99*A*.
Open-Hearth Furnaces :
basic, decarburisation rate and oxygen content of steel, 10*A*.
basic, production of alloy steel, 76*A*.
bath temperature measurement, 100*A*.
checkers, supplementary heating, 10*A*.
cleaning of slag pockets, 100*A*.
combustion, 99*A*.
control instruments, 99*A*.
doors, manipulation, 47*A*.
flame radiation and burner design, 99*A*.
heat transfer from flame to bath, 99*A*.
heating with pulverised-coal fuel oil mixtures, 99*A*.
insulation, 143*A*.
linings, maintenance, 100*A*.
linings, patching, 100*A*.

Open-Hearth Furnaces (*contd.*)—
maintenance, 100*A*.
regenerators, 100*A*.
roofs, installation, 100*A*.
roofs, refractories for, 100*A*.
roofs, suspended, 100*A*.
use of cupola iron, 100*A*.
use of graphite, 76*A*.
Open-Hearth Practice :
basic, phosphorus reactions, 459 *Paper*.
carbon determination, 100*A*.
compared with electric-furnace practice, 76*A*.
effect on rimming steel, segregation, 11*A*., 48*A*.
maximum production, 99*A*.
relation to mill schedules, 99*A*.
relation to segregation in rimming steel, 11*A*., 99*A*.
slag control, 47*A*.
Open-Hearth Process :
acid, slag-metal reactions, 99*A*.
basic, 505 *Paper*.
basic, phosphorus distribution, 99*A*.
behaviour of hydrogen, 99*A*.
slag control, 100*A*.
slag-metal reactions, 99*A*.
Open-Hearth Slag :
basic, analysis, 161*A*.
basic, constitution, 433*P*., 489*P*., 505*P*.
viscosity, 124*A*.
Ordnance, steels for, 32*A*.
Ordnance Construction, steels for, 88*A*.
Ore Slimes, preparation, 91*A*.
Ores, mining and treatment, 39*A*., 91*A*.
Overheating :
chromium-molybdenum-nickel steel, effect on transformations, 79 *Paper*.
steel, 125*A*.
Overstressing, effect in fatigue tests, 85*A*.
Oxidation :
aluminium in iron-aluminium-chromium alloys, 115*A*.
chromium-molybdenum-nickel steel, in corrosive solutions, 115*A*.
see also Scaling.
Oxide Coatings, 27*A*., 67*A*.
Oxide Films :
formation, 141*A*.
iron-aluminium-chromium alloys, 115*A*.
Oxy-Acetylene Torch, use in steelmills, 81*A*.
Oxygen :
determination in iron and steel, 68*A*.
determination in iron and steel, vacuum fusion method, 100*A*.
determination in liquid steel, 160*A*.
moist, corrosion of nitrided steel, 67*A*.
in steel, in basic open-hearth practice, 10*A*.

Paint Coatings :
electrostatic detearing, 84*A*.
protective, 159*A*.
protective value, 133*A*.
Paint Films, properties, 133*A*.
Parco Lubrizing Treatment for producing wear resisting coatings, 27*A*.
Parkerising, steel, 27*A*.
Patenting :
effect on wire, 88*A*.
wire, resistance heating of salt baths, 104*A*.
wire in salt baths, 51*A*.
wire, use of salt baths, 13*A*.
Pattern Making, 97*A*., 123*A*.
Patterns :
design, 6*A*.
gypsum cement, 97*A*.
Pearlite, effect in malleable cast iron, tensile strength, 55*A*.
Permeability :
dried moulding sand, 75*A*.
moulding sand, 96*A*., 146*A*.
Permyron Coatings, 27*A*.
Persoz and Jovignot, deep drawing test, 109*A*.
Phosphate Coatings, 27*A*.
for food containers, 83*A*.
Russian practice, 83*A*.
Phosphorus :
determination in iron and steel, colorimetric method, 68*A*.
determination in iron and steel, use of Spekker absorptiometer, 159*A*.
distribution in basic process, 99*A*.
effect in cast iron, hardness, 87*A*.
reactions in basic open-hearth practice, 459 *Paper*.
Pickling :
Bullard Dunn process, 24*A*.
De Lattre process, 24*A*.
Hanson, Van Winkle Munning Co. process, 24*A*.
merits of sulphuric and hydrochloric acids, 24*A*.
movement of material in bath, 24*A*.
steel, 24*A*., 129*A*.
strip, 82*A*.
theory, 24*A*.
use of inhibitors, 24*A*.
use of Rodine inhibitor, 82*A*.
wire, 24*A*., 82*A*.
Pickling Baskets, 24*A*.
Pickling Machine, semi-continuous, 82*A*.
Pipe Fittings :
malleable iron, production, 146*A*.
use of low-carbon steel, 147*A*.
Pipes :
cleaning, 82*A*.
corrosion, 89*A*.
production, 50*A*.
production, Fretz-Moon process, 50*A*.
Pittler-Thoma Oil Pump, 12*A*.
Planck's Formula, 152*A*.
Plastic Coatings, 133*A*.
Plasticity, coal, 144*A*.
Plastometer :
Davis, for measuring plasticity of coal, 72*A*.
Gieseler, for measuring plasticity of coal, 72*A*., 73*A*.
Plates :
carbon steel, fatigue, effect of heating, 107*A*.
reheating furnaces, 101*A*.
Plating, selective, 25*A*.

Poisson's Ratio, measurement by extensometer, 28*A*.
Polishing :
carbide dies, 14*A*.
metallographic, alloy steel, 63*A*.
metallographical specimens, 111*A*.
metals, "liquid honing" method, 130*A*.
Porcelain, *see* Refractory Materials.
Powder Metallurgy, 4*A*., 74*A*., 94*A*.
bibliography, 122*A*.
properties of iron compacts, 44*A*.
Powdered Iron, properties and tests, 122*A*.
Powdered Iron Compacts, properties, 121*A*.
Power :
electric, circuit breakers, 126*A*.
electric, Niagara district, 94*A*.
Power Plants, 2*A*.
Preheater Tubes, intercrystalline corrosion, 114*A*.
Press-Forming, steel shapes, 77*A*.
Press Tools, use of rubber, 77*A*.
Presses, hydraulic, control by oil pumps, 12*A*.
Pressing :
metals, 125*A*.
sheets, 150*A*.
Producer Gas :
cleaning, 120*A*.
for heat-treatment furnaces, 3*A*., 128*A*.
induction burners for, 120*A*.
Producers :
development in America, 93*A*.
Wellman-Cura, 3*A*.
Production Control, in steel foundries, 6*A*.
Pulverised Coal, *see* Coal, pulverised.
Pumps :
corrosion in acid-bearing waters, 159*A*.
oil, use for controlling hydraulic presses, 12*A*.
Punch Tips, use of alloy cast iron, 12*A*.

Quality Control in foundries, 8*A*., 74*A*.
Quasi-Bessemerising Process, 98*A*.
Quenched Cast Iron, hardness, effect of phosphorus, 87*A*.
Quenched Steel, transformation diagram, 128*A*.
Quenching :
isothermal, 19*A*., 51*A*., 106*A*.
in salt baths, 106*A*.
steel, prevention of distortion, 52*A*.
timed, 52*A*.
water, steel castings, 19*A*., 53*A*., 79*A*.
Quenching Media, cooling characteristics, 53*A*.
Quenching Oil, selection, 128*A*.
Quinalizarin Method, for determination of boron, 100*A*.

Radiographic Examination :
castings, 33*A*.
steel castings, 46*A*.
Radiographs :
interpretation, 64*A*.
printing, 257*P*.
Radiography :
double-exposure, improved sensitivity, 64*A*.
exposure times, 64*A*.
use for improving foundry technique, 225 *Paper*.
Rate of Loading, effect on cast iron, tensile strength, 84*A*.
Reactions :
in cupolas, 94*A*.
in side-blown converters, 9*A*., 148*A*.
slag-metal, in acid process, 99*A*.
slag-metal, open-hearth process, 99*A*.
vacuum microbalance for study of, 139*A*.
Reactivity, solid fuel, 72*A*.
Recarburisation, case-hardened parts, 105*A*.
Recrystallisation :
iron after hot deformation, 135*A*.
Krupkowski and Balicki's theory, 217*P*.
work-hardened wire, 181*P*.
Recuperators, metallic, 2*A*.
Refractory Materials, 1*A*., 40*A*., 70*A*., 91*A*., 118*A*., 143*A*.
basic, behaviour of metal plates in, 100*A*.
for Bessemer converters, 143*A*.
bulk-density, 118*A*.
effect of coal gas, 1*A*.
for electric furnaces, 71*A*.
heat storage capacity, 118*A*.
history of development, 91*A*.
ladle nozzles for, 143*A*.
for open-hearth roofs, 100*A*.
permeable, for furnaces, 40*A*.
spalling tests, 119*A*.
tests, 70*A*.
thermal conductivity, 118*A*.
Refractory Materials (Alumino-Silicate), properties, 40*A*.
Refractory Materials (Carbon Bricks) for blast furnaces, 40*A*., 119*A*.
Refractory Materials (Chrome Bricks), properties and applications, 1*A*.
Refractory Materials (Chrome-Magnesite Bricks), properties and applications, 1*A*.
Refractory Materials (Chromite) :
action of chlorine, 71*A*.
heat content at high temperatures, 71*A*.
specific heat at low temperatures, 71*A*.
Refractory Materials (Diatomaceous Earth), properties, 92*A*.
Refractory Materials (Diatomite), action of chlorine, 71*A*.
properties, 41*A*.
Refractory Materials (Firebrick) :
action of chlorine, 71*A*.
durability, 118*A*.
effect of methane, 1*A*.
Refractory Materials (Fireclay), action of steam and sulphur dioxide, 70*A*.
effect of reheating, 119*A*.
Refractory Materials (Ganister), properties, 92*A*.
Refractory Materials (Magnesite), action of chlorine, 71*A*.

Refractory Materials (Porcelain), behaviour under stress at high temperatures, 92*A*.
Refractory Materials (Silica Bricks) :
determination of quality, 100*A*.
effect of reheating, 119*A*.
Refrigeration, effect on high-speed steel, 79*A*., 109*A*.
Regenerators :
heat transfer, calculation, 41*A*.
for open-hearth furnaces, 100*A*.
Reheating Furnaces :
for forgings, 102*A*.
for ingots and slabs, 12*A*., 102*A*.
metallic recuperators, 2*A*.
open-fired, atmosphere control, 12*A*.
for plates, 101*A*.
pusher-type, 101*A*.
roller-hearth, 101*A*.
walking-beam type, 102*A*.
Rephosphorisation :
mechanism, 505*P*.
physical chemistry, 485*P*.
Republic Steel Corp. :
methods of determining residual elements, 100*A*.
moisture control in blast furnaces, 94*A*.
plant, 76*A*.
Research, metallurgical, 62*A*.
Residual Alloying Elements, determination in steel, 100*A*.
Reynolds Equipment for detection of cracks, 31*A*.
Rheology, relation to strength of materials, 55*A*.
Rimming Steel :
segregation, relation to open-hearth practice, 11*A*., 48*A*., 99*A*.
Risers for steel castings, 329*P*.
Rod Mills, driving, 103*A*.
Rodine Inhibitor, use in pickling, 82*A*.
Roll-Forging, twist drills, 151*A*.
Roll Forming, 15*A*.
Roll Pressures, measurement, 103*A*.
Rolling :
alloy steel, 14*A*., 103*A*.
calculation of spread, Eklund formula, 14*A*.
cold, effect on iron alloys, strain hardening, 57*A*.
cold-, effect on manganese steel, structure, 62*A*.
cold, strip, 15*A*.
hot, energy consumption, 50*A*.
strip, 15*A*.
Rolling-Mill Plant :
Atlas Steels, Ltd., 103*A*.
Gt. Lakes Steel Corp., 103*A*.
Jones & Laughlin Steel Corp., 103*A*.
Rolling Mill Practice, 14*A*., 50*A*., 103*A*., 126*A*.
American, 14*A*.
Rolling Mill Tables, amplidyne control, 15*A*.
Rolling Mills :
bar, 103*A*.
bar, driving, 103*A*.
bar, roll design, 103*A*.
bearings, lubrication, 126*A*.
Rolling Mills (*contd.*)
billet, 14*A*.
billet, for alloy steel, 14*A*.
billet, guides for, 50*A*.
cogging, 14*A*.
cogging for alloy steel, 14*A*.
control, Metadyne system, 15*A*., 126*A*.
Krause, 104*A*.
lost time in production, 15*A*.
measurement of roll pressures, 103*A*.
motors, electronic control, 103*A*.
pilot, 50*A*.
rod, driving, 103*A*.
screw downs, 103*A*.
sheet bar, 14*A*.
slabbing, 14*A*.
strip, 15*A*., 103*A*., 127*A*.
strip, wide, 103*A*.
tube, 15*A*., 104*A*.
Rolls :
cast steel, production, 96*A*.
casting, 14*A*.
design, 14*A*.
design for bar mills, 103*A*.
Rubber, use for press tools, 77*A*.
Runners for steel castings, 329*P*.
Russia :
blast-furnace plant at Magnitogorsk, 93*A*.
iron ore deposits, 118*A*.
iron and steel industry, 46*A*.

S-Curves, 51*A*.
chromium-molybdenum-nickel steel, 79*P*., 96*P*.
interpretation and use, 16*A*.
steel, 133*P*.
Salford Magnetic Sorting Bridge, 60*A*.
Salt-Bath Pots, corrosion by molten nitrates, 71 *Paper*.
Salt Baths :
for hardening of steel, 16*A*.
for patenting wire, 13*A*., 51*A*.
for quenching, 106*A*.
resistance heating, for patenting of wire, 104*A*.
for treatment of high-speed steel before hardening, 50*A*.
use of chromium-nickel steel, 153*A*.
Sand, properties, 92*A*.
Scale :
quantity produced in America, 99*A*.
removal from steel, 81*A*.
Scaling :
cobalt alloys, 60*A*.
see also Oxidation.
Schenck's Equilibrium Diagrams, 468*P*.
Scrap :
alloy steel, utilisation, 76*A*.
baling, 150*A*.
efficient use, 11*A*.
identification, 11*A*.
quantity produced in America, 99*A*.
see also Swarf.
Screw Threads, effect on fatigue, 58*A*.
Screwdown, for rolling mills, 103*A*.
Segregation :
in cast alloys, 48*A*.

Segregation (*contd.*)—
in chromium-molybdenum-nickel-vanadium steel, 48*A*.
in ingots, 48*A*.
in lead-bearing steel, determination by exudation test, 283*P*.
in lead-bearing steel ingots, 273 *Paper*.
nitrogen in steel, 99*A*.
rimming steel, relation to open-hearth practice, 11*A*., 48*A*., 99*A*.
Separation, magnetic, iron from scrap, 91*A*.
Shafts, fatigue, 110*A*.
Shearing, strip, 127*A*.
Shears, automatic, 50*A*.
Sheet Bar Mills, 14*A*.
Sheets :
crystal orientation, 112*A*.
galvanising, effect of carbon content of steel, 26*A*.
pressing, 150*A*.
Shells :
forging, 12*A*., 13*A*., 77*A*.
forging, dies for, 102*A*.
heat-treatment, 78*A*.
Ship Construction, use of stainless steel stampings, 77*A*.
Ships' Bottoms, identification of marine growths, 116*A*.
Shot-Peening :
chilled and hardened shot for, 110*A*.
effect on fatigue, 110*A*.
Shrink-Fit Stresses, 136*A*.
Shrink Fits, 19*A*.
Siemens-Halske Electric Furnace, 11*A*.
Silica Bricks, *see* Refractory Materials.
Silico-Manganese, solubility of carbon, 4*A*.
Silicon, deoxidation of steel, effect on strain-age embrittlement, 55*A*.
Silicon Iron, barley-shell structure, 105 *Paper*.
Silicon Steel, cast, effect of heat treatment, 64*A*.
Siliconising, steel, 78*A*.
Silicosis in foundries, 97*A*.
Silver :
electrodeposition, 130*A*., 132*A*.
liquid, spreading on steel, 83*A*.
Silver-Soldering, tools, 22*A*.
Sink Heads, use for moulds for grey-iron castings, 98*A*.
Sinter, use in blast-furnaces, 43*A*.
Sintering Plants :
standardisation, 91*A*.
Wheeling Steel Corp., 91*A*.
Slabbing Mills, 14*A*.
Slabs, reheating furnaces, 102*A*.
Slag :
analysis, 69*A*.
basic constitution, 391 *Paper*.
basic electric-furnace, constitution, 395*P*.
basic open-hearth, analysis, 161*A*.
basic open-hearth, constitution, 433*P*., 489*P*., 505*P*.
coal ash, flow on furnace walls, 144*A*.
control in open-hearth practice, 47*A*.
control in open-hearth process, 100*A*.
cupola, granulated, use for core sand, 6*A*.
open-hearth, viscosity, 124*A*.
quantity produced in America, 99*A*.
Slag (*contd.*)—
recovery of vanadium, 121*A*.
Slag Metal Reactions :
in acid process, 99*A*.
open-hearth process, 99*A*.
Slag Particles, movement in liquid steel, 149*A*.
Slag Pockets, cleaning, 100*A*.
Smelting, Krivoi-Rog ore, 3*A*.
Soda Ash, use for desulphurisation of iron, 5*A*.
Sodium-Chloride Solution, corrosion of iron, 66*A*.
Soil, corrosion of metals, 141*A*.
Soldering :
lead-coated steel, 132*A*.
silver, tools, 22*A*.
Solidification :
malleable cast iron, 95*A*.
steel ingots, 125*A*.
Solidification Rates, steel, 124*A*.
Sorting Bridge, magnetic, 60*A*.
South Wales, effect of war conditions in steel industry, 147*A*.
Soviet Union, *see* Russia.
Spalling Tests, refractory materials, 119*A*.
Specific Heat, chromite at low temperatures, 71*A*.
Specifications :
electrodeposited coatings, 82*A*.
German, tests of moulding sand, 45*A*.
Spectrograph, uses and limitations, 161*A*.
Spectrum Analysis, 69*A*., 100*A*., 117*A*. 161*A*.
graphic calculator for, 69*A*.
Spekker Absorptiometer, for determination of phosphorus, 159*A*.
Spheroidising, 127*A*.
Sponge Iron :
Anderson process, 4*A*.
Brassert process, 4*A*.
Hoganäs process, 4*A*.
production, 94*A*.
Wiberg process, 4*A*.
Spraying :
aluminium, 130*A*.
metals, 28*A*.
tin, 130*A*.
zinc, 130*A*.
Spreading, liquid metals on solid metals, 83*A*.
Spring Steel, cold working and forming, 152*A*.
Springs :
failure, 58*A*.
hair, production and heat treatment, 51*A*.
leaf, heat treatment, 78*A*.
use of case-hardened steel, 17*A*.
Stability, dimensional, steel, 65*A*.
Stainless Clad-Steel, production, 131*A*.
Stainless Steel :
bending, calculation of "spring-back," 135*A*., 151*A*.
effect of nitrogen, 138*A*.
nitriding, 154*A*.
stress-corrosion cracking, 89*A*., 112*A*., 113*A*.
welding, 108*A*.

Stainless-Steel Stampings, use for ship construction, 77*A*.
Stainless-Steel Tubes, spiral, manufacture, 126*A*.
Stampings, stainless steel, use for ship construction, 77*A*.
Standard Steel Spring Co., heat-treatment plant, 78*A*.
Steam :
action on refractory materials, 70*A*.
corrosion of steel, 35*A*.
Steel :
air hardenability, 59*A*.
alloy, flakes in, 100*A*.
alloy, hardenability, 33*A*., 86*A*.
alloy, hardenability band determination, 87*A*.
alloy, hardenability, effect of carbon, 59*A*.
alloy, heat embrittlement, 137*A*.
alloy, isothermal treatment, 127*A*.
alloy, manufacture in electric furnaces, 74*A*.
alloy, nitriding, 61*A*.
alloy, polishing, metallographic, 63*A*.
alloy, production in basic electric furnaces, 47*A*., 76*A*.
alloy, properties and uses, 60*A*.
alloy, rolling, 14*A*., 103*A*.
alloy, temper brittleness, 137*A*.
alloy, trends in development, 111*A*.
alloy, welded, effect of heat treatment, 107*A*.
alloy (low), impact strength, 85*A*.
alloy (low), stress relief, effect of time and temperature, 105*A*.
alloy (low), tensile strength, effect of fibre, 55*A*.
alloy (low), tensile strength, effect of notches, 55*A*.
aluminium-coated, spot welding, 80*A*.
automobile, hardenability, 87*A*.
bonderising, 28*A*.
carburisation, concentration/depth gradient, 16*A*.
carburisation, mechanism, 16*A*.
case-hardened, measurement of case-depth, 16*A*.
case-hardened, bend and impact tests, 84*A*.
case-hardened, use for springs, 17*A*.
case-hardening, effect of alloying elements, 16*A*.
chromium-plated, friction against cast-iron, 31*A*.
copper brazing, 80*A*.
correlation of test results with performance in service, 33*A*.
corrosion resistant, development, 111*A*.
corrosion by steam, 35*A*.
damping capacity, effect of heat treatment, 45 *Paper*.
deoxidation, 100*A*.
die, properties, 88*A*.
dimensional stability, 65*A*.
distribution of carbon between titanium and iron, 112*A*.
drawability, determination, 13*A*.
effect of boron, 138*A*.
Steel (*contd.*)—
effect of carbon, 28*A*.
effect of induction hardening, 32*A*.
embrittlement, 55*A*.
forgeability, determination by twist tests, 13*A*.
fracture, 134*A*., 156*A*.
galvanised, tensile tests at high temperatures, 112*A*.
gases in, 100*A*.
hardenability, 30*A*.
hardenability, effect of chromium, 59*A*.
hardenability, effect of molybdenum, 66*A*.
hardenability, effect of nickel, 59*A*.
heat-resistant, creep, 137*A*.
heat resistant, development, 111*A*.
heat treatment, theory, 15*A*.
high-tensile, properties, 158*A*.
high-tensile, spot welding, 20*A*.
lead-bearing, detection of lead by lead prints, 101*A*.
lead-bearing, etching, 285*P*.
lead-bearing, inclusions, 277 *Paper*.
lead-bearing, machinability, 54*A*.
lead-bearing, mode of occurrence of lead, 281 *Paper*.
lead-bearing, segregation, 273 *Paper*.
lead-bearing, segregation, determination by exudation test, 283*P*.
lead-coated, 132*A*.
lead-coated, properties, 83*A*.
liquid, movement of slag particles, 149*A*.
low-carbon, for castings, 147*A*.
National Emergency, applications, 32*A*.
National Emergency, composition, 31*A*.
National Emergency, fatigue, 110*A*.
National Emergency, hardenability, 65*A*.
National Emergency, hardenability effect of alloying elements, 28*A*.
National Emergency, for oil-well drilling equipment, 62*A*.
National Emergency, properties, 32*A*., 87*A*., 158*A*.
National Emergency, tensile properties, effect of alloying elements, 28*A*.
for naval use, 32*A*.
nitriding, 50*A*., 105*A*.
nitriding, effect of pre-heat treatment, 55 *Paper*.
nitrogen segregation, 99*A*.
for ordnance, 32*A*.
parkerising, 27*A*.
pickling, 24*A*.
precleaning for welding, 81*A*.
production, 9*A*., 46*A*., 76*A*., 98*A*., 124*A*., 147*A*.
properties at low temperatures, 60*A*.
quenched, transformation diagram, 128*A*.
rimming, segregation, effect of open-hearth practice, 11*A*., 48*A*.
rimming, segregation, relation to open-hearth practice, 11*A*., 99*A*.
selection for post war applications, 111*A*.
shallow-hardening, hardenability tests, 59*A*.

Steel (*contd.*)—
siliconising, 78*A*.
solidification rates, 124*A*.
spreading of liquid silver on, 83*A*.
strain-age embrittlement, effect of deoxidation with silicon, aluminium, and titanium, 55*A*.
for valves, 32*A*.
weldability, 21*A*., 108*A*.
Steel Castings, *see* Castings, steel.
Steel Industries, *see* Iron Industries.
Steel Plants :
Granite City Steel Co., 46*A*.
Kaiser Co., Inc., 10*A*., 40*A*.
lighting, 150*A*.
maintenance of equipment, 129*A*.
maintenance problems, 46*A*.
physical control methods, 148*A*.
Republic Steel Corp., 76*A*.
treatment of cooling water, 101*A*.
water supply, 9*A*., 150*A*.
western United States, 76*A*.
Strain-Age Embrittlement, steel, effect of deoxidation with silicon, aluminium, and titanium, 55*A*.
Strain Gauge :
acoustic, 134*A*.
rosette, 134*A*.
Strain-Hardening, iron alloys during cold-rolling, 57*A*.
Stress :
determination by X-ray, bibliography, 139*A*.
distribution, determination by X-rays, 33*A*.
measurement in tensile test pieces, 134*A*.
Stress-Corrosion, alloys, 112*A*.
Stress Corrosion Cracking :
aluminium alloys, 113*A*.
carbon steel, 113*A*.
chromium steel, 113*A*.
stainless steel, 89*A*., 112*A*., 113*A*.
wire, 141*A*.
Stress Relief :
low-alloy steel, effect of time and temperature, 105*A*.
welded girders, 21*A*.
welds, 22*A*., 81*A*.
Stressed Parts, crystallite-deformation at surface of, 29*A*.
Stresses :
residual, in chromium-molybdenum-nickel steel tubes, due to heat treatment, 32*A*.
residual, determination in chromium-molybdenum steel, 29*A*.
shrink-fit, 136*A*.
in welded structures, 81*A*.
Strip :
bonderising, 27*A*.
bright annealing, 18*A*.
cold rolling, 15*A*.
electrogalvanising, 131*A*.
electro-tinning, 27*A*., 131*A*.
pickling, 82*A*.
rolling, 15*A*.
shearing, 127*A*.
Strip Mills, 15*A*., 103*A*., 127*A*.
wide, 103*A*.
Structural Steel :
effect of induction hardening, 32*A*.
weldability, determination by impact and bend tests, 85*A*.
Structure :
barley-shell, high-silicon iron, 105 *Paper*.
casting, effect of dissolved gases, 100*A*.
centrifugally cast steel, 303*P*.
cleavage, iron-silicon alloys, 63*A*.
manganese steel, effect of cold-rolling, 62*A*.
nitrided steel, 128*A*.
X-ray crystal, 64*A*.
Sulphate of Ammonia, production, 144*A*.
Sulphur :
determination in iron and steel, 159*A*.
recovery from coke-oven gas, 2*A*.
recovery from coke-oven gas, Thylox process, 3*A*.
Sulphur Dioxide, action on refractory materials, 70*A*.
Super-Finish, bearing races, 23*A*.
Superheating, cast iron, 45*A*.
Surface Finish :
measurement, 54*A*., 109*A*., 154*A*.
qualitative inspection, 54*A*.
Surfaces :
hard, effect on fatigue strength, 157*A*.
metallic, capillarity, 83*A*.
Swarf :
briquetting, 45*A*.
reclamation, 155*A*.
Sweden :
iron industry, 121*A*.
iron ore resources, 39*A*.
Swelling Pressure, coal, measurement, 72*A*., 73*A*.
Sword Moulds, early, origin and use, 4*A*.

Tank-Track Links, use of whiteheart malleable iron, 6*A*.
Tank-Track Spindles, heat treatment, 153*A*.
Tank-Turret Rings, heat-treatment, 18*A*.
Tanks, water, corrosion, 67*A*.
Tears, hot, in steel castings, 329*P*.
Technical Cohesive Strength :
metals, 155*A*.
metals at low temperatures, 84*A*.
Tellurium, use for steel castings, 95*A*.
Temper Brittleness, alloy steel, 137*A*.
Temperatures :
control, 152*A*.
high, behaviour of insulating materials under stress, 92*A*.
high, behaviour of porcelain under stress, 92*A*.
high, compression strength of moulding sand, 145*A*.
high, hardness tests, 30*A*.
high, heat content of chromite, 71*A*.
high, properties of chromium-nickel steel weld metal, 31*A*.
high, properties of mould surfaces, 96*A*.
high, tensile tests of galvanised steel, 112*A*.
low, properties of metals, 60*A*.
low, specific heat of chromite, 71*A*.

Temperatures (*contd.*)—
low, technical cohesive strength, 84*A*.
low, transformation of retained austenite, 65*A*.
low, treatment of high-speed steel, 19*A*., 65*A*., 79*A*., 109*A*., 154*A*.
low, treatment of steel, 107*A*.
measurement, open-hearth furnace baths, 100*A*.
Tempering :
cobalt steel, 60*A*.
double, high-speed steel, 106*A*.
Tensile Properties :
cast iron, 54*A*.
chromium-molybdenum-nickel steel, 93*P*.
low-alloy cast steel, 31*A*.
National Emergency steel, effect of alloying elements, 28*A*.
Tensile Strength :
cast iron, effect of rate of straining, 84*A*.
chromium-nickel steel, effect of fibre, 55*A*.
chromium-nickel steel, effect of notches, 55*A*.
effect of length of test piece, 155*A*.
malleable cast iron, effect of constituents, 55*A*.
relation to indentation hardness, 86*A*.
Tensile Test Bars, stress distribution, determination by X-rays, 33*A*.
Tensile Test Specimens, stress measurement, 134*A*.
Tensile Tests :
galvanised steel at high temperatures, 112*A*.
significance, 28*A*.
true stress-strain, 84*A*.
Test Bars :
tensile, stress distribution, determination by X-rays, 33*A*.
tensile, stress measurement, 134*A*.
Test Results, correlation with performance in service, 33*A*.
Testing Machines :
fatigue, Avery, 157*A*.
hardness, Bierbaum, 86*A*.
hardness, micro-, 86*A*.
load calibration, 155*A*.
torsion, 135*A*.
Tests :
bead-weld nick-bend, for weldability, 108*A*.
bend, case-hardened steel, 84*A*.
coking, coal, 93*A*.
corrosion, humidity cabinet for, 36*A*.
corrosion, total-immersion, 88*A*.
creep, interpretation of data, 87*A*.
creep, metals, 87*A*.
cupping, for determining drawability, 13*A*.
deep-drawing, 85*A*.
deep-drawing, Erichsen, 109*A*.
deep-drawing K.W.I., 109*A*.
deep-drawing, Persoz and Jovignot, 109*A*.
drawing, wedge, 136*A*.
fatigue, 137*A*.
fatigue, effect of overstressing and understressing, 85*A*.
hardenability, Jominy, 30*A*., 58*A*., 86*A*., 110*A*.
Tests (*contd.*)
hardenability, Jominy, cast steel, 30*A*.
hardenability, for shallow-hardening steel, 59*A*.
hardness, indentation, 86*A*.
hardness, magnetic, 30*A*.
impact, case-hardened steel, 84*A*.
impact, notched-bar, variables affecting results, 29*A*.
machinability, use of Leyensetter pendulum apparatus, 54*A*.
magnetic, 157*A*.
moulding sand, 75*A*.
moulding sand, German standards, 45*A*.
non-destructive, 109*A*.
refractory materials, 70*A*.
spalling, refractory materials, 119*A*.
tensile, galvanised steel at high temperatures, 112*A*.
tensile, significance, 28*A*.
tensile, true stress-strain, 84*A*.
twist, for determining forgeability, 13*A*.
wedge, for determining drawability, 13*A*.
Thawing Chamber for frozen iron ore, 40*A*.
Thermal Conductivity :
determination, 41*A*.
refractory materials, 118*A*.
Thermocouples, 152*A*.
Thermodynamic Properties, chromium carbides, 87*A*.
Thorium-Bearing Steel, nitriding, 61*A*.
Thylox Process for recovery of sulphur from coke-oven gas, 3*A*.
Tin :
determination in iron and steel, 159*A*.
electrodeposition, 130*A*.
spraying, 130*A*.
Tin Coatings, fusion, 27*A*.
Tin-Lead Coatings, thickness determination, 160*A*.
Tinning :
cast iron, Kolene process, 83*A*.
electro, 131*A*.
electrolytic, strip, 27*A*.
Tinplate Industry, American, 27*A*.
Titanium :
deoxidation of steel, effect on strain-age embrittlement, 55*A*.
effect in chromium-manganese-molybdenum-nickel steel, 157*A*.
effect in high speed steel, cutting capacity, 106*A*.
Titanium Carbide in steel, 112*A*.
Titanium Steel, enamelled, drawing properties, 158*A*.
Tocco Process of induction heating, 153*A*.
Tool Steel :
determination of cobalt, photometric method, 68*A*.
identification systems, 23*A*.
Tools :
cutting, arc-deposited alloys for, 108*A*.
cutting, hard tipping, 22*A*.
repair, 22*A*.
Torsion Testing Machines, 135*A*.
Transformation Diagrams :
isothermal, 65*A*.
quenched steel, 128*A*.

Transformations :
austenite, isothermal, 16*A*.
chromium-molybdenum-nickel steel, effect of overheating, 79 *Paper*.
high-speed steel, under pressure, 35*A*.
iron alloys, 140*A*.
iron-cobalt-tungsten alloys, effect of chromium, 66*A*.
isothermal, steel, 133 *Paper*.
isothermal, chromium-molybdenum-nickel steel, 96*P*.
retained austenite at low temperatures, 65*A*.
Tube Mills, 15*A*., 104*A*.
Tubes :
chromium-molybdenum-nickel steel, residual stresses due to heat treatment, 32*A*.
chromium-nickel steel, failure, 57*A*.
drawing, lubricating compounds, 49*A*.
molybdenum steel, graphitisation, 156*A*.
preheater, intercrystalline corrosion, 114*A*.
seamless, cold reduction, 15*A*.
seamless, production, 15*A*., 50*A*., 104*A*.
spiral, manufacture, 126*A*.
Tubes, Ltd., plant, 104*A*.
Tukon Microhardness Testing Machine, 58*A*.
Tungsten :
determination in iron and steel, 117*A*.
effect in chromium steel, 61*A*.
effect in high-speed steel, cutting capacity, 106*A*.
Tungsten-Carbide Dies, development, 77*A*.
Turbines :
aerodynamic, use in steel industry, 42*A*.
air, with closed cycle, 41*A*.
Turnings, briquetting, 11*A*.
Tuyeres, blast-furnace, 121*A*.
Twist Drills, roll-forging, 151*A*.
Twist Tests, for determining forgeability, 13*A*.
Tyres, production, 104*A*.

Understressing, effect in fatigue tests, 85*A*.
United Kingdom, iron industry, reorganisation, 9*A*.
United States :
blast-furnace design, 121*A*.
by-products production, 99*A*.
canning industry, 132*A*.
chrome ore deposits, 39*A*.
consumption of chemicals in steel industry, 99*A*.
development of ordnance steel, 32*A*.
gas-producer practice, 93*A*.
iron-ore deposits, 39*A*.
metals used in chemical engineering equipment, 87*A*.
rolling mill practice, 14*A*.
scale production, 99*A*.
scrap production, 99*A*.
slag production, 99*A*.
steel for naval use, 32*A*.
tinplate industry, 27*A*.
western, steel plants, 76*A*.
United States Bureau of Mines, production of electrolytic manganese, 74*A*.

Vacuum, melting cast iron, 45*A*.
Vacuum-Fusion Method, for determination of oxygen, 100*A*.
Valve Steel, properties, 32*A*.
Valves, alloy-steel, production, 6*A*.
Van der Horst Process, for producing porous chromium coatings, 25*A*.
Vanadium :
behaviour in iron ore preparation, 39*A*.
effect in cast iron, 138*A*.
effect in chromium steel, 61*A*.
effect in high speed steel, cutting capacity, 106*A*.
in iron ore, 39*A*.
recovery from slag, 121*A*.
Vanadium Ore Deposits, British Columbia, 118*A*.
Vapour Blasting, 130*A*.
Varnish Coatings for steel cartridge cases, 133*A*.
Ventilation, foundries, 9*A*.
Vermiculite, properties, 41*A*.
Virginia Coal, properties, 117*A*.
Viscosity, open-hearth slag, 124*A*.
Volatile Matter, determination in coal, furnace for, 161*A*.

Water, cooling, treatment, 101*A*.
Water-Cooling Systems, heat transfer, effect of oil-emulsion treatment, 125*P*.
Water Supply, for steel plants, 9*A*., 46*A*., 150*A*.
Waterloo Main Colliery, coal cleaning plant, 120*A*.
Wear :
balls in cylindrical mills, 30*A*.
metals, 157*A*.
see also Abrasion.
Wear Resistance, chromium coatings, 25*A*.
Wedge Drawing Test, 136*A*.
Wedge Tests for determining drawability, 13*A*.
Weld Metal :
austenitic, properties and structural transformation on straining, 87 *Paper*.
chromium-nickel steel, properties at high temperatures, 31*A*.
properties at low temperatures, 60*A*.
relation between impact value and type of fracture obtained in bend test, 85*A*.
Weldability :
bead-weld nick-bend test for, 108*A*.
cast steel, 20*A*.
manganese steel, 107*A*.
steel, 21*A*., 108*A*.
structural steel, determination by impact and bend tests, 85*A*.
Welded Alloy Steel, effect of heat treatment, 107*A*.
Welded Girders, stress-relief, 21*A*.
Welded Joints, regalvanising, 27*A*.
Welded Parts, distortion, 129*A*.
Welded Structures :
compared with Meehanite castings, 81*A*.
stresses, 81*A*.

Welded Tubes, chromium-molybdenum steel, strength, 20*A*.
Welding :
arc, metallurgy, 19*A*.
atomic hydrogen, tools, 22*A*.
cast iron, use of boron-treated electrodes, 53*A*.
castings, 129*A*.
electric arc, energy input, 53*A*.
helium-shielded arc process, 108*A*.
low-temperature, high-speed steel, 53*A*.
precleaning of steel for, 81*A*.
resistance, 20*A*.
resistance, recommended practice, 129*A*.
spot, aluminium, 20*A*.
spot, aluminium-coated steel, 80*A*.
spot, carbon steel, 20*A*.
spot, chromium - molybdenum - nickel steel, 20*A*.
spot, chromium-nickel steel, 20*A*.
spot, high tensile steel, 20*A*.
spot, magnesium alloys, 20*A*.
stainless steel, 108*A*.
steel, 80*A*.
steel castings, 108*A*.
steel mill equipment, 129*A*.
Welding Electrodes, 21*A*.
aluminium, 80*A*.
boron treated, 53*A*.
cast iron, 80*A*.
coated, properties, 21*A*.
copper, 80*A*.
determination of moisture in coatings, 129*A*.
metallic arc, 80*A*.
nickel, 80*A*.
stainless steel, 80*A*.
Welding Equipment, use of nitrided steel, 67*A*.
Welds :
cooling rate, 80*A*.
cracks in, 21*A*.
heat energy input, 80*A*.
resistance, properties, 20*A*.
resistance, properties, bibliography, 21*A*.
stress relief, 22*A*., 81*A*.
Wellman-Cura Gas Producer, 3*A*.
Westinghouse Electric & Mfg. Co., foundry plant, 124*A*.
Wheeling Steel Corporation, maintenance of plant, 129*A*.
Wheels, railway, production, 104*A*.
Whirl-Gate Head for steel castings, 366*P*.
Wiberg Sponge Iron Process, 4*A*.
Wien's Displacement Law, 152*A*.
Williams Prize :
awarded to G. D. Elliot, 6*P*.
awarded to R. W. Evans, 6*P*.
Wire :
Armco iron, work hardening, 181 *Paper*.
cleaning, 130*A*.
coating, Ecco method, 130*A*.
drawing, 13*A*.
Wire (*contd.*)
drawing, calculation charts, 49*A*.
drawing, calculation of reduction in area, 13*A*.
drawing, lubricating compounds, 49*A*.
drawing, reactive, 151*A*.
drawing dies, use of diamond powder, 49*A*.
drawing machines, electrical equipment for, 49*A*.
effect of patenting, 88*A*.
galvanised, corrosion, 67*A*.
manganese steel, drawing, 13*A*.
patenting, resistance heating of salt baths, 104*A*.
patenting, use of salt baths, 13*A*., 51*A*.
pickling, 24*A*., 82*A*.
stress-corrosion cracking, 141*A*.
treatment in molten glass, 14*A*.
Wire-Drawing Machinery, speed control, 77*A*.
Wire Mills :
guides for, 50*A*.
lay-out, 126*A*.
Wire Ropes, failure, 57*A*.
Work-Hardening, Armco iron, 181 *Paper*.
Worn Parts, building up by electro-deposition, 26*A*.
Wrapping Material, for prevention of corrosion, 68*A*., 116*A*.
Wright Aeronautical Corp., method of metal spraying, 28*A*.
Wrought Iron, manufacture, 44*A*.

X-Ray Crystal Analysis, 64*A*.
X-Ray Diffraction, application, 111*A*.
X-Ray Equipment, General Electric X-Ray Corp., 33*A*.
X-Ray Examination :
castings, 98*A*., 225*A*.
ladle stoppers, 47*A*.
steel castings, 74*A*.
X-Ray Exposures, photoelectric timer for, 159*A*.
X-Rays :
determination of stress, bibliography, 139*A*.
for determining stress distribution in tensile test pieces, 33*A*.

Zinc :
corrosion in water, 67*A*.
electrodeposition, 130*A*.
spraying, 130*A*.
Zinc Coatings :
effect of copper, 26*A*.
passivation, Cronak process, 25*A*.
passivation, Passival Process, 25*A*.
passivation, Rushtol Passivation "A" Process, 25*A*.
pliable, 131*A*.

NAME INDEX.

Abresch, K. :
decomposition of nitrides in steels, 161*A*.
determination of nitrogen in iron and steel, 68*A*.
Adam, W. B., corrosion of food cans, 115*A*.
Ade, J. :
heat-treating machine-gun links, 19*A*.
leaf-spring production, 78*A*.
Agnew, C. E., beneficiated iron-bearing materials, 43*A*.
Aiken, J. C., drawing rope wire, 49*A*.
Akulov, N. S., magnetic analysis of metals, 64*A*.
Albaugh, J. N., meters and controls in tilting furnaces, 99*A*.
Alber, K., cement dust in moulds, 97*A*.
Albers, K., notched-bar impact and bend tests to determine weldability of steels, 85*A*.
Albin, J., designing rubber press tools, 77*A*.
Alexander, J. J., blast-furnace moisture control, 93*A*.
Alexander, S. C., high-temperature conveyor belts, 51*A*.
Alimov, A. N., isothermal treatment of alloy steels, 127*A*.
Allen, H. L., operation and maintenance of mixers, 100*A*.
Allen, N. P., lead in steel, 295*P*.
Allendorf, H., compressed air supplies in foundries, 75*A*.
Allison, A., penetration of lead through cast iron, 296*P*.
Allison, F. H., gases in steel, 100*A*.
Allison, F. H., jun., cast steel roll manufacture, 96*A*.
Allsman, P. T., chromite deposits in Montana, 39*A*.
Allsop, H., metallurgy of arc welding, 19*A*.
Almen, J. O., precautions when induction and flame-hardening, 153*A*.
Alton, F., corrosion of steel by high-temperature steam, 35*A*.
Amtsberg, H. C., sub-zero treatment of steels, 107*A*., 154*A*.
Anderson, A. L., elected Member, 7*P*.
Anderson, R. H., permeable refractories for furnaces, 40*A*.
Andrews, C. M., fineness and consistency tests of enamel slips, 132*A*.
Angus, H. T. :
feeding of steel castings, 382*P*.
heat-treatment of cast structures, 64*A*.
elected Member, 7*P*.
Anke, F., cogging and billet mill trains for alloy steel, 14*A*.
Applegate, G. F., high-frequency furnace installations, 124*A*.
Arend, A. G., hot cropping, 77*A*.
Arend, H., quality of high-speed steels, 109*A*.
Arkharov, V. I. :
chromium electrodeposits, 25*A*.
friction of cast iron against chromium-plated steel, 31*A*.
Arnold, F. M., induction-heating unit for steel cartridge cases, 153*A*.
Arnold, S. M., fatigue tests of screw threads, 58*A*.
Ascik, A. L., standard melting methods for alloy steels, 47*A*.
Asinovskaya, G. A., non-ferrous metals replaced by nitrided steel, 67*A*.
Assonov, A. D., gaseous-carburisation, 17*A*.
Aul, E. L., effect of fibre on tensile strength of low-alloy steel, 55*A*.
Auld, D. J., elected Member, 7*P*.
Austin, C. R. :
annealing cold-rolled iron and binary iron alloys, 57*A*.
graphitisation of carbon steels at sub-critical temperatures, 57*A*.
Austin, J. B., hydrogen in steel, 100*A*.
Avery, H. S., end-quench hardenability test, 58*A*.

Babcock, H. J. :
isothermal quench baths, 51*A*., 106*A*.
Bablik, H. :
addition of aluminium to zinc for galvanising, 82*A*.
lead-zinc galvanising process, 26*A*.
Bach, J. L., million-volt X-ray inspection unit, 33*A*.
Bagchi, A., elected Associate, 8*P*.
Bailes, J. G., standard moulding sand for experimental steel castings, 385*P*.
Bailey, G. L., elected Member, 7*P*.
Baker, E. M., specifications for electro-deposited metal coatings, 82*A*.
Baker, P., elected Associate, 8*P*.
Baldwin, A. T., galvanising fluxes, 82*A*.
Baldwin, R. L., economical use of furnace electrodes, 10*A*.
Bales, C. E., drying and preheating foundry ladles, 122*A*.
Balicki, M. :
Paper : "A Study of Work-Hardening and Reannealing of Iron," 181*P*. *Correspondence*, 223*P*. *Author's Reply*, 224*P*.
Ball, C. S., elected Associate, 8*P*.
Ball, L. W., radiographs of aircraft parts, 64*A*.
Ball, N. de, measuring and recording roll pressures, 103*A*.
Bangert, W. M., thermodynamic properties of carbides of chromium, 87*A*.
Banks, A. P., elected Member, 7*P*.
Barber, E. :
reflected light in metallurgy, 62*A*.
steel ingots, 125*A*.

Bardgett, W. E., and **R. E. Lismer :**
Paper : "Mode of Occurrence of Lead in Lead-Bearing Steels and the Mechanism of the Exudation Test," 281*P*. *Joint Discussion*, 294*P*. *Joint Correspondence*, 296*P*. *Authors' Replies*, 299*P*.
Baresch, H., dried moulding sands, 75*A*.
Barlow, T. E., vanadium in grey iron castings, 138*A*.
Barnard, G. H., elected Member, 7*P*.
Barnes, H. C., cupola hot metal for open-hearth furnaces, 100*A*.
Barr, W., control methods in steel industry, 148*A*.
Barrett, C. S., electron microscope in metallurgical research, 139*A*.
Barrett, L. R. :
action of chlorine on refractory materials, 71*A*.
refractory insulating products, 92*A*.
steam and sulphur dioxide reactions on refractory materials, 70*A*.
Bateman, J., elected Associate, 8*P*.
Bayly, J. R., elected Associate, 8*P*.
Beach, N., elected Associate, 8*P*.
Beauchamp, H. R., elected Member, 7*P*.
Becker, F. L., hardenability intensifiers, 100*A*.
Belcher, R., elected Member, 7*P*.
Belikova, E. I., hard tipping of cutting tools, 22*A*.
Bell, L. P., elected Member, 7*P*.
Benitez, A. T., Mexico's iron mountain, 118*A*.
Bennek, H., diffused chromium coatings, 25*A*.
Bennett, R. W. :
mould surface gas pressure, 146*A*.
properties of hot mould surfaces, 96*A*.
Benninghoff, W. E., frequency and time cycle control for induction heating, 52*A*.
Bergsman, E. B., applications of microhardness testing machines, 86*A*.
Berkelhamer, L. H., moulding sands, 96*A*.
Berner, L. R., delivery of ingots to rolling mills, 99*A*.
Bernhart, C. B., jun., isothermal transformations of steels, 65*A*.
Berthold, R., magnetic powder testing stand, 31*A*.
Betteridge, W., nitride case on austenitic steel, 128*A*.
Beynon, R. E., rolling of semi-finished steel, 14*A*.
Biers, H., formation of hot-tears in steel castings, 384*P*.
Bierwagen, R. W., mechanising Westinghouse Electric foundry, 124*A*.
Bills, K. M., elected Associate, 8*P*.
Binder, I. A., effects of nitriding austenitic steels, 105*A*.
Binder, W. O. :
computing springback when bending stainless steel, 135*A*., 151*A*.
susceptibility of austenitic stainless steels to stress-corrosion cracking, 113*A*.
Binnie, D., structure of centrifugally cast steel, 324*P*.
Birch, R. E., refractories for open-hearth roofs, 100*A*.
Bird, A. C., elected Member, 7*P*.
Birdsall, G. W. :
baling sheet scrap, 150*A*.
crushing and briquetting swarf, 45*A*.
deep-drawing oil sump pans, 125*A*.
die quenching to avoid heat-treatment distortion, 52*A*.
gap-mill forging, 151*A*.
heat-treatment methods for circular parts, 18*A*.
porous chromium-plated surfaces, 25*A*.
spectrographic laboratory of Allis-Chalmers Manufacturing Co., 161*A*.
Birkhead, T. K., elected Associate, 8*P*.
Birks, H., elected Member, 7*P*.
Bischof, F. :
effect of phosphorus on hardness of quenched cast iron, 87*A*.
effect of rate of straining on strength of cast iron, 84*A*.
Bischoff, W. G. :
controlled hardenability, 86*A*.
hardenability requirements of alloy steels, 33*A*., 86*A*.
Bishop, H. F., heat-treatment of cast steel, 106*A*.
Bishop, R. W., inoculation of cast iron, 145*A*.
Blanch, W. J., protective coatings on metals, 130*A*.
Bland, R. B., properties of flash-welded tubing, 20*A*.
Blayden, H. E., molecular nature of bituminous coals, 120*A*.
Boardman, H. C., stresses in welded structures, 81*A*.
Bock, W. K., tensile properties of low-alloy cast steels, 31*A*.
Boegehold, A. L., selecting automobile steels on basis of hardenability, 87*A*.
Boehne, E. W., power circuit breakers, 126*A*.
Boericke, F. S., thermodynamic properties of carbides of chromium, 87*A*.
Boetcher, H. N. :
cracking and embrittlement in boilers, 58*A*.
graphitisation of piping, 156*A*.
Bogatzki, G., photometric determination of cobalt in tool steels, 68*A*.
Bohny, C. M., stress-free annealing of electric-welded steel, 21*A*.
Bollenrath, F., resistance of aluminium alloys to stress-corrosion cracking, 113*A*.
Bond, A. E., elected Member, 7*P*.
Borzdika, A. M., case-hardened mild steel for springs, 17*A*.
Boss, G. H., hot and cold cracks in welded joints, 21*A*.
Boulger, F. W., measuring drawability of deep-drawing steels, 85*A*.
Bowman, F. E., partition of molybdenum in steel, 66*A*.

Box, R. J., and **B. A. Middleton :**
Paper : "Corrosion of Steel Salt-Bath Pots by Molten Alkali Nitrates," 71*P*.
Boyle, C. J., magnetic particle inspection of forgings, 156*A*.
Bradey, M. J., bath temperature measurement, 100*A*.
Brain, A. G., elected Associate, 8*P*.
Bray, J. L., lead plating, 83*A*.
Brearley, H., "scrapalurgy"—efficient use of scrap, 11*A*.
Brech, F., X-rays in engineering problems, 64*A*.
Bredenbeck, R., die materials, 88*A*.
Bregman, A., electrogalvanising, 26*A*.
Bremer, E., features of new grey iron foundry, 8*A*.
Brewer, R. E., plastic characteristics of coal, 144*A*.
Brick, R. M., segregation in alloy castings, 48*A*.
Bridgman, P. W., flow and fracture of metals, 155*A*.
Briggs, C. W., hardenability of cast steel, 30*A*.
Briggs, J. Z., elected Member, 7*P*.
Brigham, W. B., elected Associate, 8*P*.
Brighton, K. W., metallic substitutes for hot-dipped tinplate, 27*A*.
Broadston, J. A., measuring surface finish, 109*A*.
Brock, R. B., thermostatic control, 152*A*.
Brokhin, I. S., centrifugal lining of cylinder liners, 7*A*.
Bromfield, G. C., determination of tin in steels, 159*A*.
Brook, W. H., utilising coal to best advantage, 144*A*.
Brooks, W. B., weldability of manganese steels, 107*A*.
Brown, C. M. :
computing springback when bending stainless steel, 135*A*., 151*A*.
susceptibility of austenitic stainless steels to stress-corrosion cracking, 113*A*.
Brown, E. J., examination of experimental steel castings, 385*P*.
Brown, G. L., load calibration equipment for testing machines, 155*A*.
Brown, H. W., strength of spot-welds in aluminium-coated steel, 80*A*.
Brown, J., plant for carbonisation of coal, 93*A*.
Brown, O. E., corrosion-proofing steel sheets, 27*A*.
Brown, R. H., stress-corrosion tests of alloy steels, 112*A*.
Brown, W. D. :
nitrogen in steel, 99*A*.
Brown, W. E., sponge iron, 94*A*.
Bruckner, W. H. :
effects of heat-treatment on fatigue strength of steel, 107*A*.
metallurgical notch in fatigue failure, 29*A*.
Buckley, A. B., elected Associate, 8*P*.
Buckley, J. H., elected Member, 7*P*.
Bucknall, E. H., transformation of steels and production of martensite, 172*P*.
Buckwalter, T. V., fatigue tests on national emergency steels, 110*A*.
Buell, W. C., jun., cupola iron in open-hearth furnaces, 100*A*.
Buente, C. F., semi-continuous pickling plant, 82*A*.
Bukhman, N. A., powdered alloys in brazing low-alloy tools, 22*A*.
Bull, J. H., manufacturing parts by powder metallurgy, 74*A*.
Bulle, G., standardisation of blast-furnaces, 3*A*.
Bullock, G., elected Associate, 8*P*.
Bungardt, W., resistance of aluminium alloys to stress-corrosion cracking, 113*A*.
Bunk, A. P., use of cooling rates for evaluation of weldability of steel, 80*A*.
Burdon, A. M., elected Member, 7*P*.
Bureau, A. G., powder metallurgy, 4*A*.
Burgess, C. O., inoculation of cast iron, 145*A*.
Burns, G., isothermal transformation of steels, 177*P*.
Burton, D., elected Associate, 8*P*.
Busch, H., stress-free annealing of electric-welded steel, 21*A*.

Cable, J. W., induction heating for annealing and melting, 104*A*.
Caine, J. B., hardenability of steel, 30*A*., 110*A*.
Calicoat, I. E., shaved aircraft gears, 23*A*.
Cameron, A. M., rolling-mill plant at Atlas Steels, Ontario, 103*A*.
Cameron, R. C. W., elected Member, 7*P*.
Campbell, R. A., forging and heat-treatment furnaces fired with pulverised coal, 41*A*.
Capper, H., elected Member, 7*P*.
Carlisle, D., vanadium-bearing deposits in British Columbia, 118*A*.
Carrington, F. G., spinning speeds of centrifugal casting machines, 98*A*.
Carroll, J. B., elected Associate, 8*P*.
Catton, A. H., elected Member, 7*P*.
Catton, D. E., elected Member, 7*P*.
Caugherty, J. J., use of glass baths in wire drawing, 14*A*.
Challoner, C., elected Member, 7*P*.
Chambers, W. A., jun., determination of chromium in steel, 116*A*.
Charlton, E. J., welded structures versus mechanite castings, 81*A*.
Chernyak, V. S., non-ferrous metals replaced by nitrided steel, 67*A*.
Chesters, J. H. :
alumino-silicate refractories, 40*A*.
chrome ore and chrome refractories, 1*A*.
insulation of steel-plant equipment, 40*A*.
Chipman, J., effects of superheating grey cast iron, 45*A*.
Chubb, W. F., effect of alloys in centrifugally cast steel, 321*P*.

Churchman, A. T., elected Associate, 8*P*.
Cina, B., elected Associate, 8*P*.
Clark, C. L. :
evaluating steel forgeability, 13*A*.
failure by cracking of still tubes, 57*A*.
Clark, J., elected Member, 7*P*.
Clark, K. L., heat-treatment of cast steel, 106*A*.
Clements, J. F., refractory insulating products, 92*A*.
Clements, P. G., elected Associate, 8*P*.
Clews, F. H. :
action of chlorine on refractory materials, 71*A*.
refractory materials under stress, 92*A*.
Clogg, M., jun. :
cleavage structures of iron-silicon alloys, 63*A*.
fractography, 63*A*.
Close, G. C., organic coating aids magnetic inspection, 59*A*.
Clough, G., elected Associate, 8*P*.
Coates, G. E., electrolytic corrosion of metals, 35*A*.
Cobb, J. W., products of carbonisation, 3*A*.
Cockaday, R. E., elected Associate, 8*P*.
Coe, H. L., electrical maintenance, 47*A*.
Cohen, M., dimensional stability of steel, 65*A*.
Cohen, P., coal-ash slag on furnace walls, 144*A*.
Colbeck, E. W. :
Paper : "Emulsions of Oil in Water as Corrosion Inhibitors." *See* Hamer, P.
Coleman, A. M., determination of hydrocyanic acid in coke-oven gas, 117*A*.
Colley, F. A. D., elected Associate, 8*P*.
Collin, K. L., elected Member, 7*P*.
Colton, W. J., elected Member, 7*P*.
Compton, K. G., corrosion protection of metals, 68*A*.
Comstock, G. F. :
deoxidation preventing strain-ageing in low-carbon steel, 55*A*.
tests of high-strength plate steels, 157*A*.
Connolly, B. J., elected Associate, 9*P*.
Connor, F. G., elected Member, 7*P*.
Cook, E., end-quench hardenability test, 58*A*.
Cook, R. L., properties of enamel frits, 133*A*.
Cooke, W., elected Member, 7*P*.
Corbitt, R., elected Associate, 9*P*.
Cordovi, M. A. :
distortion in welding, 129*A*.
properties of welds in carbon steels, 20*A*.
Cornelius, H. :
alloy steels for valves of internal combustion engines, 32*A*.
heat-treatable steels for nitriding, 61*A*.
resistance of aluminium alloys to stress-corrosion cracking, 113*A*.
scaling resistance of alloys with different cobalt contents, 60*A*.
Cosman, C. M., treated steels for food cans, 83*A*.
Cotton, J. F., magnetic powder inspection of castings, 59*A*.
Cottrell, A. H. :
Paper : "Tensile Properties of Unstable Austenite and its Low-Temperature Decomposition Products," 93*P*.
Cousans, F., summarising First Report of Foundry Practice Sub-Committee, 383*P*., 384*P*., 385*P*., 386*P*., 387*P*.
Coyle, T. G., applications of chromium plating, 82*A*.
Craft, C. H., colorimetric determination of nickel in steel, 68*A*.
Craig, J. H., tensile tests of galvanised steel at high temperatures, 112*A*.
Craig, W., elected Member, 7*P*.
Crane, E. V., powder metallurgy, 4*A*.
Crawford, C. W. J., constitution of basic open-hearth slag, 557*P*.
Crawford, T. J., bath temperature measurement, 100*A*.
Cress, W. C., converter refractories, 143*A*.
Cribb, R. J. P., elected Associate, 9*P*.
Crook, W. J., weldable steel castings, 20*A*.
Cross, A. H. B., steel foundry practice, 386*P*.
Crossley, H. E., fluorine in coal, 117*A*.
Crouch, W. M., jun., stainless clad steel, 131*A*.
Crout, J. S., use of tellurium, for chilled castings, 95*A*.
Crum, E. J., graphs of wire mill mathematical problems, 49*A*.
Culhane, P., tool design for forging, 102*A*.
Cullen, O. E., recarburisation of case-hardened parts, 105*A*.
Cunnick, R. C., effects of time and temperature on relief of stresses in low-alloy steels, 105*A*.
Cunningham, R. C., corrosion resistance of stainless steel, 154*A*.
Cunningham, R. L., heat-treatment problems, 16*A*.
Currie, W. J., flame cutting of steel, 129*A*.
Cush, J. J., elected Associate, 9*P*.
Cutbush, E. G., elected Member, 7*P*.
Cutton, J. G., isothermal transformation of national emergency steels, 65*A*.

Dadswell, C. J. :
effect of deoxidation on feeding of steel castings, 384*P*.
elected Member, 7*P*.
Dahle, F. B., measuring drawability of deep-drawing steels, 85*A*.
Dale, J., blast-furnace design and operation, 3*A*.
Darsey, V. M., chemical coatings on steel, 27*A*.
David, W. T., flame gases, 93*A*.
Davidson, B. M., oxy-acetylene hardening, 17*A*.
Davies, C., jun., by-products of the steel industry, 99*A*.
Davies, D. E., elected Associate, 9*P*.

Davies, R. E., elected Member, 7*P*.
Davis, C. E., metal-rolling practice, 15*A*.
Davis, D. O., production of ordnance materials, 5*A*.
Davis, E. W., ball wear in cylindrical mills, 30*A*.
Davis, J. D. :
carbonising properties of West Virginian coal, 144*A*.
carbonising properties of Western Region coals, 144*A*.
Davydov, A. A., centrifugal lining of cylinder liners, 7*A*.
Dawihl, W., powder metallurgy, 121*A*.
Dawson, D. W. O., elected Associate, 9*P*.
Dearden, M., elected Associate, 9*P*.
Debenham, W. S., testing steel-plants' refractories, 70*A*.
Decker, B. F., orientations of crystals in rolled metals, 112*A*.
Delves, B. G., wire pistol method of metal spraying, 28*A*.
DeMichael, D. J., stress and strain in tensile-test specimens, 134*A*.
Dennison, J. P., elected Associate, 9*P*.
DePoy, S. M., sub-zero treatment to improve tool steel, 79*A*.
Derge, G. :
determination of oxygen in steel by vacuum-fusion method, 100*A*.
elected Member, 7*P*.
Desai, N. L., elected Member, 7*P*.
Desch, C. H. :
past and future of steel, 98*A*.
properties of basic open-hearth slags, 536*P*.
Dews, J. W., elected Member, 7*P*.
Dickinson, D., corrosion of food cans, 115*A*.
Diepschlag, E., moulding sand tests, 45*A*.
Dietert, H. W. :
mould surface gas pressure, 146*A*.
properties of hot mould surfaces, 96*A*.
spectrographic equipment for metal control, 161*A*.
Dix, E. H., jun., stress-corrosion tests of alloy steels, 112*A*.
Dixon, E. O., elected Member, 7*P*.
Dixon, F. C., elected Member, 7*P*.
Dixon, H. I., alloy pots for liquid heat-treating media, 153*A*.
Dobbins, N. E., steam and sulphur dioxide reactions on refractory materials, 70*A*.
Dobson, D. I., gating malleable castings, 146*A*.
Dodd, A. E., fuel economy and refractory materials, 118*A*.
Doelman, R. L. :
mould surface gas pressure, 146*A*.
properties of hot mould surfaces, 96*A*.
Doig, J., jun., iron foundry methods and problems, 123*A*.
Donaldson, A. I., elected Member, 7*P*.
Donaldson, J. W. :
British metallurgical institutes and research associations, 62*A*.
metals and alloys at sub-zero temperatures, 60*A*.
Donoho, C. K., centrifugal casting of steel, 98*A*.
Dorman, A., speech at Luncheon, 14*P*.
Dost, F. J., maintenance work in foundries, 147*A*.
Dougill, G., cleaning producer gas, 120*A*.
Downie, C. C., automatic control of open-hearth furnace doors, 47*A*.
Drogseth, A. G., elected Member, 7*P*.
Dube, A., heat-treatment problems, 16*A*.
Dudadevsky, V., Magnitogorsk iron and steel works, 93*A*.
Dunbeck, N. J., gas developed in moulds, 45*A*.
Duncan, J. B., automobile castings, 94*A*.
Dunlop, A., precision casting by lost-wax process, 123*A*.
Durant, R. L., exposure times in metal radiography, 64*A*.
Dutt, N. C., elected Associate, 9*P*.

Eagan, T. E., tinned cast iron for babbitted bearings, 83*A*.
Eakin, C. T., metallographic test for malleable iron, 55*A*.
Earley, C. C., elected Associate, 9*P*.
Eastwood, W. P., requirements of castings for machine tools, 145*A*.
Eaton, W., elected Member, 7*P*.
Ebert, L. J. :
effect of fibre on tensile strength of low-alloy steel, 55*A*.
effect of notches on tensile strength of low-alloy steels, 55*A*.
Eckel, E. J., hardenability of 4150 steel, 30*A*.
Edmiston, J., use of alloy scrap for production of high-speed steel, 76*A*.
Eilender, W., quality of high-speed steels, 109*A*.
Elder, J. L., carbonising properties of Western Region coals, 144*A*.
Elliot, G. D., award of Williams Prize, 6*P*.
Ellis, G., crack detection by use of fluorescent solution, 85*A*.
Ellis, O. B., stress-corrosion cracking of austenitic stainless steel, 113*A*.
Elmendorf, H. J., hot-quenching and austempering, 53*A*.
Elms, R. V., castings inspection and the purchaser, 147*A*.
Elson, G. P., elected Associate, 9*P*.
Entwistle, L. P., manganiferous iron-ore deposits, New Mexico, 39*A*.
Erbe, J. R., continuous electro-zinc plating, 131*A*.
Ericsson, G., determination of low-carbon contents in steel, 116*A*.
Espey, G., tool design for forging, 102*A*.
Ess, T. J., Chicago steel plant for Defence Plant Corporation, 76*A*.
Euler, H., analysing lost time in rolling-mill production, 15*A*.
Evans, B. S., detection of lead in steels and brasses, 101*A*.
Evans, U. R., metallic corrosion, 88*A*.

Ewing, J. R., protective coatings on metals, 24*A*.

Fairbairn, J., elected Member, 7*P*.
Fairbank, L. H., elected Associate, 9*P*.
Fairley, T., analysis of basic open-hearth slags, 539*P*.
Fallot, M., magnetic properties of iron-cobalt alloys, 157*A*.
Farquhar, N. G., sulphur recovery from coke-oven gas, 2*A*.
Fazio, T. C., determining case depth of carburised steels, 16*A*.
Fechter, F., three zone ingot furnace, 12*A*., 101*A*.
Fehling, H. R., thermal insulation, 71*A*.
Fehr, R. O. :
damping of materials during flexual vibration, 135*A*.
stress and strain in tensile-test specimens, 134*A*.
Fell, E. W., effect of vibration on centrifugally cast steel, 319*P*.
Fenstermacher, W. H., air hardenability of steels, 59*A*.
Ferguson, H. E., purging of pipe lines, 121*A*.
Ferguson, J. M., insulation of open-hearth and blast-furnaces, 143*A*.
Ferrall, L. L., determining hardenability limits of alloy steels, 86*A*.
Fetz, E., dynamic hardness testing, 30*A*.
Fetzer, M. C. :
air hardenability of steels, 59*A*.
graphitisation of carbon steels at sub-critical temperatures, 57*A*.
Feygin, N. I., anti-friction cast iron, 5*A*.
Ffield, P., improving steel castings, 46*A*.
Fieldner, A. C., hydrogenation and liquefaction of American coals, 144*A*.
Findlay, F. B., elected Member, 7*P*.
Fischer, A., granulation of cupola slag, 6*A*.
Fischer, F., abbreviations for metallic materials, 33*A*.
Fischer, P., spectrographic determination of tungsten in steel, 117*A*.
Fischer, W. A., dissociation of carbon monoxide in contact with iron and iron alloys, 43*A*.
Fishel, W. P., carbon distribution between titanium and iron in steels, 112*A*.
Fisher, A. J., flame radiation in open-hearth operation, 99*A*.
Fitterer, G. R., activities of the Acid Open-Hearth Research Association, 99*A*.
Fitzjohn, R., elected Member, 7*P*.
Flagg, H., pulverised-coal and fuel-oil mixtures for heating open-hearth furnaces, 99*A*.
Fletcher, S. G., dimensional stability of steel, 65*A*.
Flickinger, C. H., determining residual alloying elements, 100*A*.
Flickinger, L. C., boron determinations by Quinalizarin method, 109*A*.
Flynn, F. E., shearing flat rolled steel, 127*A*.
Fontaine, W. E., microstructural guide to heat-treatment of carbon steel, 78*A*.
Forsberg, H., electrostatic spraying and detearing, 84*A*.
Forsyth, H. J., production and quality in open-hearth furnaces, 99*A*.
Forsyth, P. J. E., elected Associate, 9*P*.
Fortune, J. B., blast-furnace tuyeres, 121*A*.
Foster, H. W., fatigue-testing apparatus, 137*A*.
Foundry Practice Sub-Committee, First Report, 329*P*. *Discussion*, 382*P*. *Correspondence*, 387*P*. *Sub-Committee's Reply*, 389*P*.
Fowler, H. W., jun., cutting fluids, 109*A*.
Fox, G., elected Member, 7*P*.
Francis, J. L., inoculation of cast iron, 94*A*.
Frank, H. S., basic open-hearth roofs, 100*A*.
Franks, R. :
computing springback when bending stainless steel, 135*A*., 151*A*.
low-carbon chromium steels, 61*A*.
susceptibility of austenitic stainless steels to stress-corrosion cracking, 113*A*.
Frear, C. L., magnetic powder inspection of castings, 156*A*.
Freeman, J. W., failure by cracking of still tubes, 57*A*.
Frenkel, J., oxide films on metal surfaces, 141*A*.
Freudenthal, W., movement of material in pickling baths, 24*A*.
Frey, M. L., timed quenching, 52*A*.
Frommer, the late Leopold, and A. Murray :
Paper : "The Influence of the Heat Treatment of Steel on the Damping Capacity at Low Stresses," 45*P*.
Frostick, H. G., generators for fusion of tin coatings, 27*A*.
Frye, F. C., fuel supply system of Great Lakes Steel Corp., 2*A*.
Frye, J. H. :
selection of rolled or drawn steels, 110*A*.
special steels for ordnance purposes, 32*A*., 88*A*.

Gabes, L., arc welding in plant of Ohio Steel Foundry Co., 108*A*.
Gandhi, P. N., elected Member, 7*P*.
Gardiner, W. C., electrochemical industries of Niagara, 94*A*.
Gauthier, J., precleaning steel for welding, 81*A*.
Geary, W., constitution of basic open-hearth slag, 561*P*.
Geijer, P., Swedish iron ore resources, 39*A*.
Geller, W. :
hydrogen in solid steel, 160*A*.
hydrogen and oxygen in liquid steel, 160*A*.

Geller, Yu. A. :
hard-tipping of cutting tools, 22*A*.
powdered alloys for brazing low-alloy tools, 22*A*.
Gepfert, J. H., tension and velocity controls, 77*A*.
Gerasimoff, J., activities of components in austenite, 35*A*.
Gertsman, S. L., testing case-hardened bars, 84*A*.
Gezelius, R. A., water-quenching of steel castings, 53*A*.
Ghosh, D., elected Associate, 9*P*.
Gibbons, W. L., heat-treating broaches, 51*A*.
Gibson, F. H., rare elements in coal, 72*A*.
Gibson, J., molecular nature of bituminous coals, 120*A*.
Gibson, S., elected Member, 7*P*.
Gilbert, F., moisture content of furnace atmospheres, 2*A*.
Gilbert, F. C., elected Member, 7*P*.
Gillespie, C., builders' castings, 123*A*.
Gillett, H. W., cupola raw materials, 44*A*.
Gilmour, J. M., elected Associate, 9*P*.
Godfrey, H. J., effects of variations in patenting on tensile strength of wire ropes, 88*A*.
Goetcheus, P., handling appliances for heat-treatment furnaces, 153*A*.
Goetz, W., testing mould and core sands, 75*A*.
Goldsbrough, W., determination of blast-furnace profiles, 42*A*.
Goldschmidt, H. J. :
Paper : "The Constitution of Basic Steel Furnace Slags," *see* Rait, J. R.
constitution of basic open-hearth slag, 558*P*.
Goodeve, C. F., elected Member, 7*P*.
Goodwin, G. H., miniature blast-furnace, 121*A*.
Gordon, Lord D. G., elected Member, 7*P*.
Goss, N. P., effect of cold-rolling on manganese steel, 62*A*.
Gotta, A., determination of oxygen in steel, 68*A*.
Götzl, F., addition of aluminium to zinc for galvanising, 82*A*.
Goult, J. M., elected Associate, 9*P*.
Gow, J. T., shot for metal peening, 110*A*.
Graham, C. S. :
Paper : "Examination of Two Ingots of Free-Cutting Steel, One Containing Lead and the Other Lead-Free," 273*P*. *Joint Discussion*, 294*P*. *Joint Correspondence*, 296*P*. *Authors' Replies*, 299*P*.
Graham, J. D., grating-type spectrograph, 117*A*.
Grainger, J. A., light presswork production, 125*A*.
Grange, H., elected Member, 7*P*.
Grant, B. E., elected Member, 7*P*.
Gray, A. G., lead plating of steel, 132*A*.
Gray, A. R., elected Member, 7*P*.
Green, A. T. :
action of chlorine on refractory materials, 71*A*.
fuel economy and refractory materials, 118*A*.
refractory insulating products, 92*A*.
refractory materials under stress, 92*A*.
steam and sulphur dioxide reactions on refractory materials, 70*A*.
Greene, T. W., relieving stress in long welds, 81*A*.
Greenwood, The Rt. Hon. The Viscount, speech at Luncheon, 16*P*.
Gregg, J. L., chemicals used in steel industry, 99*A*.
Griffith, H. M., basic roofs, 100*A*.
Griffiths, R., work-hardening and reannealing of iron, 223*P*.
Griggs, J. O., graphite in open-hearth furnace charge, 76*A*.
Grodzinski, P., servicing department for wire-drawing dies, 102*A*.
Grover, S. F., elected Associate, 9*P*.
Groves, W. T., formulation of carburising processes, 78*A*.
Gruber, E. W., steel mill maintenance, 129*A*.
Grunke, K., new moulding process for grey iron castings, 75*A*.
Gulbransen, E. A., vacuum microbalance, 139*A*.
Güldner, W., town's water supply for iron and steel works, 9*A*.
Gulyaev, A. P., cutting properties of high-speed steels, 23*A*.
Gunn, D. C., permeable refractories for furnaces, 40*A*.
Gunning, H. C., vanadium-bearing deposits in British Columbia, 118*A*.
Gurney, C., effect of length on tensile strength, 155*A*.
Guthmann, K., water supply for iron and steel works, 9*A*., 150*A*.
Gworek, J. M., determining viscosity of acid open-hearth slags, 124*A*.

Hagemeyer, H. F., elimination of micro-shrinkage, 147*A*.
Hague, H. J., electronic control for resistance furnaces, 17*A*.
Hahn, G., creep strength of heat-resisting steels, 137*A*.
Haim, G., moisture content of electrode coatings, 129*A*.
Haines, G. W., elected Member, 7*P*.
Hall, J. H., steel foundry pouring practice, 75*A*.
Hallett, M. M., effect of vibration on centrifugally cast steel, 319*P*.
Halley, J. W., segregation in rimming steel ingots, 11*A*., 48*A*., 99*A*.
Halls, E. E., electro-nickel plating, 131*A*.
Halupka, H. A., elected Member, 7*P*.
Ham, J. L., diffusion of molybdenum in austenite and ferrite, 66*A*.
Hamer, P., L. Powell, and **E. W. Colbeck :**
Paper : "Emulsions of Oil in Water as Corrosion Inhibitors," 109*P*. *Correspondence*, 127*P*. *Authors' Reply*, 130*P*.

Hamilton, I. G., elected Associate, 9*P*.
Hammond, C. P., rolling-mill plant at Atlas Steels, Ontario, 103*A*.
Hampl, M., determining solidification rates, 124*A*.
Hannam, J. C., elected Associate, 9*P*.
Hannon, J. W. G., silicosis in foundries, 97*A*.
Hanson, J. H. A., elected Member, 7*P*.
Harder, O. E., shot for metal peening, 110*A*.
Harding, E. W., quality control in the foundry, 74*A*.
Harker, D., grain shape and grain growth, 63*A*.
Harper, S., elected Associate, 9*P*.
Harris, F. E. :
concentration/depth gradient in carburising, 16*A*.
formulation of carburising processes, 78*A*.
Harris, P., arc-welded cutting alloys, 108*A*.
Harrison, T. S., absorptiometric determination of phosphorus in iron and steel, 159*A*.
Hart, C. :
electric furnace pig iron, 4*A*.
electrometallurgical treatment of ores, 10*A*., 74*A*.
Hart, T. M., preparation of raw materials at plant of Kaiser Co., Inc., 2*A*.
Hartford, R. L., pilot rolling mills, 50*A*.
Hartigan, R. H., determination of hydrocyanic acid in coke-oven gas, 117*A*.
Hartleif, G., recrystallisation after hot-deformation, 135*A*.
Hartley, H. M., refrigeration and nitriding to extend life of tools, 79*A*.
Hartley, J. H., refractory materials, 91*A*.
Hartmann, F. :
movement of slag particles in liquid steel, 149*A*.
preparation of ore slimes, 91*A*.
Haut, F. J. G., elected Member, 7*P*.
Hawkins, M. L., production of malleable iron pipe-fittings, 146*A*.
Hays, F. N., heat transfer from the flame to the bath, 99*A*.
Hazel, J. B., sulphate production by crystallisation method, 144*A*.
Hazen, F. D., American suspended silica roof, 100*A*.
Heasman, N., elected Member, 8*P*.
Heckmann, W., treatment of cooling water, 101*A*.
Heidenhain, W., heating salt baths for patenting steel wire, 104*A*.
Helmer, G., surface defects on ingots and billets, 48*A*.
Hencky, H., nature of plastic deformation, 29*A*.
Henderson, J., presentation to Institute of portrait of, 3*P*.
Henry, A. G., steel plant maintenance, 46*A*.
Hentschel, H. F., power circuit-breakers, 126*A*.
Herz, P. L., diamond powders for die work, 49*A*.
Herzog, H., rolling wide steel strip, 103*A*.
Hess, W. F. :
application of welding to steel, 53*A*.
cooling rates of steel after electric welding, 80*A*.
use of cooling rates for evaluation of weldability of steel, 80*A*.
Heuer, R. P., basic open-hearth roofs, 100*A*.
Heumann, G. W., magnetic speed control of roller-hearth furnaces, 128*A*.
Heumann, T., iron/iron-sulphide/iron-boride system, 140*A*.
Hewson, T. A., "rosette" strain calculator, 134*A*.
Hickey, J. P., special low-carbon steel for castings, 147*A*.
Higgins, W. W., preparation of metal surfaces for porcelain enamelling, 132*A*.
Hiles, J., combustion of coke, 73*A*.
Hill, E. G. :
maximum production in open-hearth furnaces, 99*A*.
elected Member, 8*P*.
Hill, R. G., hardenability and carbon content of steels, 59*A*.
Hinman, C. W., hydraulic bending and forming, 77*A*.
Hino, J., hardenability of steel, 30*A*.
Hipperson, A. J., post-heat-treatment of spot-welded steels, 20*A*.
Hirst, L. L., hydrogenation and liquefaction of American coals, 144*A*.
Hoar, T. P. :
oil emulsion as corrosion inhibitor, 127*P*.
pickling of steel, 24*A*.
Hockings, R. A., elected Member, 8*P*.
Hodgson, C. C., and **H. O. Waring** :
Paper : "A note on the Relationship between Preliminary Heat Treatment and Response to Nitriding of some Nitriding Steels," 55*P*.
Hodgson, M. M., elected Member, 8*P*.
Hofe, W. vom, cyclone dust-catchers, 121*A*.
Hohage, R., tungsten, molybdenum and vanadium in chromium-steels, 61*A*.
Holden, A. F., elected Member, 8*P*.
Holden, A. H., elected Member, 8*P*.
Holdsworth, A., coal preparation plant at Waterloo Colliery, Yorkshire, 120*A*.
Hollomon, J. H., fracture of steel, 134*A*., 156*A*.
Holman, C., elected Member, 8*P*.
Holmes, C. R. :
carbonising properties of West Virginian coal, 144*A*.
carbonising properties of Western Region coals, 144*A*.
Holt, E. M., elected Member, 8*P*.
Holthaus, C., determination of nitrogen in alloy steels, 160*A*.
Holtmann, W., determination of nitrogen in alloy steels, 160*A*.
Holzbaur, A. A., relieving stress in long welds, 81*A*.

Honeyman, A. J. K. :
composition of basic open-hearth slag, 550*P*.
effect of boron to steel, 138*A*.
Hopkins, B. E., induction periods in isothermal transformation of steels, 174*P*.
Horger, O. J., fatigue tests on national emergency steels, 110*A*.
Hoult, F. H., elected Member, 8*P*.
Howie, R. C., elected Member, 8*P*.
Howson, H. O., properties of centrifugal steel castings, 322*P*.
Hoyle, G., elected Associate, 9*P*.
Hubbard, F., properties of blast-furnace slags and strength tests on concrete/slag, 73*A*.
Hubbell, W. G., formability of stainless steel sheet, 158*A*.
Huddle, A. U., isothermal transformation of steels, 176*P*.
Hudson, J. C., protective painting of structural steelwork, 159*A*.
Hue de la Colombe, J., elected Member, 8*P*.
Huffman, E. H., thermodynamic properties of carbides of chromium, 87*A*.
Hughes, D. E. R., transformation of steels and production of martensite, 171*P*.
Hughes, H. P., inoculated cast iron, 5*A*.
Hughes, I. C. H., elected Associate, 9*P*.
Hughey, H. G., oxy-acetylene cutting, 108*A*.
Hulme, E. Wyndham, sword moulds *v.* currency bars, 4*A*.
Humphries, H., elected Member, 8*P*.
Hungsberg, H., emulsion lubrication of gas engines, 14*A*.
Hunt, J. P., elected Member, 8*P*.
Hunter, E., specifications for high-duty cast iron, 123*A*.
Hurst, J. E., and **R. V. Riley :**
Paper : "A Further Note on the Microstructure of High-Silicon Acid-Resisting Iron," 105*P*. *Correspondence*, 107*P*. *Authors' Reply*, 108*P*.
cast iron metallurgy, 122*A*.
properties of centrifugally cast steel, 316*P*.
rotation speed of centrifugal-casting machines, 8*A*.
Hurst, T. W., elected Member, 8*P*.
Huseby, R. A., stress-corrosion of austenitic stainless steels, 89*A*.
Hutter, H. E., applications of permanent magnets, 60*A*.
Hyler, J. E., magnetic separators, 91*A*.

Ihre, N. E., elected Member, 8*P*.
Imhoff, W. G., copper in galvanising baths, 26*A*.
Ineson, E., nitrided steels, 105*A*.
Irish, P. R., determining residual alloying elements by spectrographic methods, 100*A*.
Isenburger, H. R. :
failures in cold-headed machine bolts, 58*A*.
stress analysis by X-ray back-reflection method, 139*A*.

Jackson, B., elected Associate, 9*P*.
Jackson, B. R., elected Associate, 9*P*.
Jackson, C. E. :
nick-bend test for weldability, 108*A*.
notched-bar impact tests on steels, 29*A*.
Jackson, G. H., failure in high-compression springs, 58*A*.
Jackson, J. F. B., crystal formation in centrifugally cast steel, 323 *P*.
Jackson, L. R., plastic flow and rupture of metals under stresses, 156*A*.
Jackson, R. :
Paper : "The Application of Radiography to the Improvement of Foundry Technique," 225*P*. *Discussion*, 259*P*. *Correspondence*, 267*P*. *Author's Reply*, 269*P*.
Jacob, A. W., silicosis in foundries, 97*A*.
James, R. S., elected Member, 8*P*.
Jameson, A. S., selecting steels by carbon content, 28*A*.
Jay, A. H. :
Paper : "A Study of the Basic Open-Hearth Process, with Particular Reference to Slag Constitution," 505*P*. *Joint Discussion*, 536*P*. *Joint Correspondence*, 557*P*. *Authors' Replies*, 563*P*.
Jefferson, T. B., repairing tools by welding, 22*A*.
Jeffery, A. T., gating and feeding malleable iron castings, 146*A*.
Jenni, C. B., X-ray inspection for ladle stoppers, 47*A*.
Jerrett, R. S., acoustic strain gauge, 134*A*.
Jeter, E. C., improvements in pressure ferrous castings, 146*A*.
Jevons, J. D., copper-brazing of steel assemblies, 80*A*.
Johnson, C. S. :
electric rocking resistor furnace, 95*A*.
elected Associate, 9*P*.
Johnson, E. R., flaking in alloy steels, 100*A*.
Johnson, G. W., heat-treatment of air-hardening steel castings, 145*A*.
Jolly, A. H., jun., slag control, 47*A*., 109*A*.
Jones, J. H., Northumberland and Durham coal seams, 118*A*.
Jones, P. G., impact tests on low-alloy steels, 85*A*.
Jones, V. W., aluminium dross as a substitute for fluorspar, 100*A*.
Jost, H. P., surface finish, 54*A*., 154*A*.
Jüthner, K., case-hardening, 16*A*.

Kathju, K. N., testing paint films, 133*A*.
Kayser, J. F., specifications, quality control and inspection, 8*A*.

Keating, F. H., importance of radiography in steel foundries, 267*P*.
Kedrov, S. M., finishing of bearing races, 23*A*.
Keller, A., life of ingot moulds, 101*A*.
Keller, C., aerodynamic turbine in the steel industry, 42*A*.
Kelley, K. K., thermodynamic properties of carbides of chromium, 87*A*.
Kelley, J. F., navy spalling test for refractories, 119*A*.
Kempf, H. :
decomposition of nitrides in steels, 161*A*.
determination of nitrogen in iron and steel, 68*A*.
Kennedy, R. G., jun., effect of sub-zero temperatures on hardened tool steel, 65*A*.
Kenneford, A. S., elected Member, 8*P*.
Kenworthy, L., water corrosion of galvanised coatings and zinc, 67*A*.
Khinsky, I. S., annealing steel strip, 18*A*.
Kiesskalt, S., lubricants which affect the seizing tendency of bearings, 14*A*.
Kilpatrick, W., elected Member, 8*P*.
Kincaid, H. F. :
grating-type spectrograph, 117*A*.
spectrographic analysis of iron and steel, 69*A*.
King, C. D., production of high-quality steels in basic open-hearth furnaces, 76*A*.
King, R. M., mechanics of enamel adherence, 132*A*.
Kinzel, A. B., trends in manufacture of alloy steels, 111*A*.
Kiper, F. :
arc welding in plant of Ohio Steel Foundry Co., 108*A*.
hardenability of cast steels, 30*A*.
Kirchberg, H., vanadium in iron ores, 39*A*.
Kiselev, A. A., magnetic-powder testing machines, 31*A*.
Klärding, J., recovery of vanadium from slags, 121*A*.
Klemencic, A., dimensions and design of plain bearings, 14*A*.
Klesper, R., failures of blast-furnace refractory linings, 118*A*.
Klimek, A. J., production of malleable iron castings, 146*A*.
Klütsch, J., ore-crushing, screening and sintering plant, 91*A*.
Knight, H., elected Member, 8*P*.
Knight, H. A. :
lead coatings on steel, 132*A*.
protection of steel parts for overseas shipment, 115*A*.
Knox, H. A., American tin-plate industry, 27*A*.
Knox, J. D., Wheeling Steel Corporation's sintering plant, 91*A*.
Ko, T., elected Member, 8*P*.
Koch, W., diffused chromium coatings, 25*A*.
Kohli, B. S., elected Member, 8*P*.
Kolar, L., case-hardening, 16*A*.
Kommers, J. B., effects of overstressing and understressing in fatigue tests, 85*A*.
Körber, F., dissociation of carbon monoxide in contact with iron and iron alloys, 43*A*.
Kornfeld, H., recrystallisation after hot-deformation, 135*A*.
Kornilov, I. I., oxide film of iron-chromium-aluminium solid solutions, 115*A*.
Körös, B., life of ingot moulds, 125*A*.
Kozelli, A., case-hardening in cyanide salt baths, 16*A*.
Krabiell, H.-J., decarburisation of steel in basic open-hearth furnaces, 10*A*.
Krainer, H., quenching oils for hardening steel, 128*A*.
Kraner, H. M., quality of silica brick, 100*A*.
Kreisel, O., low-frequency induction heating, 81*A*.
Krestnikov, S. I., cutting properties of high-speed steels, 23*A*.
Krisch, A., fatigue strength of nickel alloy and high-cobalt steels, 29*A*.
Krishnamurthy, B., elected Associate, 9*P*.
Kronsbein, J., electro-plating on wire, 130*A*.
Kuntze, W., evaluation of steels from test results, 54*A*.
Kurnakov, N. N., solubility of carbon in silico-manganese, 4*A*.
Kutil, K., colorimetric determination of phosphorus in steel, 68*A*.
Kuznetsov, V. D., super-high-speed cutting of metals, 23*A*.

Laidler, D. S., elected Associate, 9*P*.
Lajus, H. J., elected Member, 8*P*.
Lambert, R. A., open-hearth fuel control, 99*A*.
Lang, C., elected Associate, 9*P*.
Larn, J. W., elected Associate, 9*P*.
Larsen, B. M. :
segregation in steel ingots, 48*A*.
slag-bath reactions, 99*A*.
Larson, H. L., graphite rods for risers, 6*A*.
Lawrence, H., welding electrodes, 21*A*., 80*A*.
Lawson, C. C., gating and heading, 146*A*.
Lea, F. C., radiography and crack detection, 259*P*.
Lecham, S., elected Associate, 9*P*.
Lee, O. M., elected Member, 8*P*.
Lehmann, O. H., production of railway tyres and wheels, 104*A*.
Leja, J., elected Associate, 9*P*.
Lendl, A. E., T. Ekelund's formula for calculating spread in rolling, 14*A*.
Lenel, F. V., powder metallurgy, 44*A*.
Lent, H., closed-cycle air turbine-compressor plant, 41*A*.
Lessells, J. M., indentation hardness test, 86*A*.

Lesso, H. F., cracks in ingots, 11*A*.
Lethersick, W., extensometer for measuring Poisson's ratio, 28*A*.
Levy, C. C., induction-heating equipment, 104*A*.
Levy, F. L., elected Member, 8*P*.
Lewis, J. R., deoxidation preventing strain-ageing in low-carbon steel, 55*A*.
Lewis, K. B., reactive wire drawing, 151*A*.
Lewis, M. F. P., elected Associate, 9*P*.
Li, P., elected Member, 8*P*.
Liebig, G. F., jun., graphic calculator for spectrochemical analyses, 69*A*.
Liedholm, C. A., continuous cooling transformation diagram, 128*A*.
Lindsay, R. W., annealing cold-rolled iron and binary iron alloys, 57*A*.
Linford, A., steelworks pyrometry, 152*A*.
Linsley, H. E., aluminium spraying of aero-engine cylinders, 28*A*.
Lipchin, N. N., isothermal treatment of alloy steels, 127*A*.
Lisan, P., spectrographic determination of tungsten in steel, 117*A*.
Lismer, R. E. :
Paper : "Mode of Occurrence of Lead in Lead-Bearing Steels and the Mechanism of the Exudation Test." *See* Bardgett, W. E.
List, J. H., work on the spindle, 146*A*.
Liston, R., forging marine-engine parts, 77*A*.
Lloyd, A. B., production control in foundries, 6*A*.
Lloyd, T. E. :
manufacture of high-explosive shells, 12*A*.
manufacture of steel cartridge cases, 12*A*.
Lochridge, L. P., grease manufacture, 126*A*.
Locke, F. A., open-fired furnace control, 12*A*.
Logan, K. H., soil-corrosion studies, 141*A*.
Longenecker, C., Granite City Steel Company's plant, 46*A*.
Longenecker, L. S. :
behaviour of metal plates in basic refractory, 100*A*.
reconstructed plate mill furnaces, Carnegie-Illinois Steel Corporation, 101*A*.
Loria, E. A., rates of tempering of cobalt steels, 60*A*.
Loux, J. H. :
forging and heat-treatment furnaces fired with pulverised coal, 41*A*.
metallic recuperators, 2*A*.
Löwer, R., pattern-making machines, 97*A*.
Lownie, H. W., metallographic test for malleable iron, 55*A*.
Loxley, E. M., wedge-drawing test, 136*A*.
Loxton, H. T., load calibration equipment for testing machines, 155*A*.
Lubahn, J. D. :
effect of fibre on tensile strength of low-alloy steel, 55*A*.
effects of notches on tensile strength of low-alloy steel, 55*A*.
Lucas, C. M., refrigeration and nitriding to extend life of tools, 79*A*.
Lucas, C. S., low-frequency induction heating for shrinking, 19*A*.
Lueck, R. H., metallic substitutes for hot-dipped tinplate, 27*A*.
Luellen, L. B., determination of carbon during steel production, 100*A*.
Luini, L. A., annealing cold-rolled iron and binary iron alloys, 57*A*.
Lund, H., elected Associate, 9*P*.
Lundberg, H. A., combustion of gaseous fuels, 144*A*.
Lüpfert, H., machinability of steels and life of tools, 54*A*.
Luther, G. G., nick-bend test for weldability, 108*A*.
Lutts, C. G., special low-carbon steel for castings, 147*A*.
Luyken, W., vanadium in iron ores, 39*A*.
Lyons, E. H., jun., electrogalvanising, 83*A*.
Lyons, J. V., elected Associate, 9*P*.

McAdam, D. J., jun. :
cohesive strength of metals at low temperatures, 84*A*.
technical cohesive strength of metals, 155*A*.
MacArthur, D. A., shearing flat rolled steel, 127*A*.
McCarthy, F., drying and preheating foundry ladles, 122*A*.
McCartney, J. T., carbonising properties of Western Region coals, 144*A*.
McCollum, W. S., elected Member, 8*P*.
Macconochie, A. F., one-shot forging, 102*A*.
McDowell, J. K., effects of time and temperature on relief of stresses in low-alloy steels, 105*A*.
McElwee, R. G., vanadium in grey iron castings, 138*A*.
MacGregor, C. W., true stress-strain tension test, 84*A*.
McGregor, D. S., elected Member, 8*P*.
McGregor, W. J., maintenance of instruments and controls in steel plants, 46*A*.
McGuire, F. T., elected Member, 8*P*.
McHarg, W., elected Member, 8*P*.
McHugh, J. L., rolling of bars, 103*A*.
McIntyre, J., sodium-cyaniding of steel before hardening, 50*A*.
Mack, J. O., effect of post-heat in welding medium-alloy steels, 107*A*.
Mackay, M., elected Member, 8*P*.
McKenna, F. S., notched-bar impact tests on steels, 29*A*.
Mackenzie, M., elected Member, 8*P*.
McKinney, M. E., mixture calculations for producing malleable iron, 95*A*.
McLaren, J., elected Member, 8*P*.

McLean, D. :
Paper : "The Influence of Centrifugal Casting upon the Structure and Properties of Steel." *See* Northcott, L.
McMullan, O. W., hardenability test for low-carbon and shallow-hardening steels, 59*A*.
MacMullin, R. B., electrochemical industries of Niagara, 94*A*.
McNeil, J. F., spectrograph, 161*A*.
McNeill, G., pitted corrosion due to presence of oil, 128*P*.
McPherson, D., siliconising of steel, 78*A*.
MacPherson, I. H., testing case-hardened bars, 84*A*.
McQuaid, H. W. :
heat-treatment of automobile steel, 152*A*.
heat-treatment of steel, 16*A*.
selection of steels for post-war automobile manufacture, 111*A*.
McVetty, P. G. :
creep-test data, 87*A*.
chart for estimating working stresses of alloys, 85*A*.
Magnusson, N. H., Swedish iron ore resources, 39*A*.
Mahoney, J. R., Western U.S.A. steel industry, 76*A*.
Makepeace, G. R., colorimetric determination of nickel in steel, 68*A*.
Mantel, W., intercrystalline corrosion-cracking of preheater tubes, 114*A*.
Manterfield, D., constitution of basic open-hearth slag, 542*P*.
Mantle, B. S., elected Associate, 9*P*.
Mardon, H. H., elected Member, 8*P*.
Marrs, R. E., automatic preset screw-down, 103*A*.
Marshall, C. W., machine-shop practice and foundry technique, 8*A*.
Martin, D. L. :
induction hardening of carbon steels, 52*A*.
elected Associate, 9*P*.
Martin, P. A., solidification rates of malleable iron, 95*A*.
Masing, G., tests on iron in electrolytes, 66*A*.
Mason, C. F., elected Associate, 9*P*.
Mather, R. F., American national emergency steels, 31*A*.
Mayne, J. E. O., oil in water as corrosion inhibitor, 129*P*.
Mears, R. B., stress-corrosion tests of alloy steels, 112*A*.
Mebs, R. W., cohesive strength of metals at low temperatures, 84*A*.
Mehta, Y. M., elected Member, 8*P*.
Meikle, G., elected Member, 8*P*.
Meinal, W. J., stainless steel stampings for ship parts, 77*A*.
Meinhart, W. L., properties of cast chromium-molybdenum steels, 61*A*.
Menghi, S., deep-drawing tests for sheet metal, 109*A*.
Menon, P. M., elected Member, 8*P*.
Menzies, G. M., hot-tearing in steel castings, 387*P*.
Merchant, M. E., mechanics of metal-cutting processes, 154*A*.
Meredith, W. C., shrinkage cavities in steel castings, 384*P*.
Merrill, L. L., use of cooling rates for evaluation of weldability of steel, 80*A*.
Mesenhimer, O. L., use of national emergency steels in U.S.A., 32*A*.
Michailow-Michejew, P. B., brittleness of alloy steels, 137*A*.
Michie, G. M., radiographic reports of castings, 267*P*.
Mickel, E., causes of failure of gudgeon pins, 137*A*.
Middleton, B. A. :
Paper : "Corrosion of Steel Salt-Bath Pots by Molten Alkali Nitrates." *See* Box, R. J.
Mikheev, M. N., magnetic control of heat-treatment, 30*A*.
Milgate, A. J., cast iron, 74*A*.
Miller, Christina C., small scale detection of metals, 117*A*.
Millikin, J. R., isothermal transformation of national emergency steels, 65*A*.
Millward, R., elected Associate, 9*P*.
Minkevich, N. A. :
hard-tipping of cutting tools, 22*A*.
powdered alloys for brazing low-alloy tools, 22*A*.
Mitchell, J. F., elected Member, 8*P*.
Mitchell, W. M., metallurgical aspects of Bofors guns, 51*A*.
Mobey, F., elected Associate, 9*P*.
Montgomery, W., iron foundry practice, 123*A*.
Monypenny, J. H. G., medium- and high-tensile alloy steels, 138*A*.
Moon, C., merchant-bar mills at Great Lakes Steel Corporation, 103*A*.
Moore, D. C., transformation of steels and production of martensite, 172*P*.
Moore, G. E., thermodynamic properties of carbides of chromium, 87*A*.
Moore, H. F. :
effect of specimen size on fatigue strength, 86*A*.
shot-peening and fatigue of metals, 110*A*.
Moreland, H. D., automatic electronic exposure control, 159*A*.
Morey, F. C., dust-collecting systems, 24*A*.
Morfey, F. H., elected Member, 8*P*.
Morkovin, D., effect of specimen size on fatigue strength, 86*A*.
Morrison, J. G., nitriding hardened high-speed steel, 51*A*.
Morton, B. B., trends and uses of alloy steels, 60*A*.
Mott, R. A., combustion of coke, 73*A*.
Mueller, F. H., hardenability of 4150 steel, 30*A*.
Mueller, J. :
forging die design, 13*A*., 77*A*.
heating for forging, 102*A*.
Muir, A. R., elected Associate, 9*P*.

Mulcahy, B. P.:
coal selection for carbonisation, 120*A*.
effects of coke in cupola melting, 94*A*.
Mulcahy, E. W., pickling of steels, 129*A*.
Mullin, G., coal preparation, 93*A*.
Mullins, L., radiographic grading of defects, 260*P*.
Mund, A., supplementary heating of checker chambers in open-hearth furnaces, 10*A*.
Munse, W. H., effects of heat-treatment on fatigue strength of steel, 107*A*.
Murray, A.:
Paper: "The Influence of the Heat Treatment of Steel on the Damping Capacity at Low Stresses." *See* Frommer, Leopold.
Murty, D. S., elected Member, 8*P*.
Myers, D. W., elected Member, 8*P*.

Nadai, A., chart for estimating working stresses of alloys, 85*A*.
Naughton, J. J., non-magnetic wire, 13*A*.
Naylor, B. F., heat contents of ferrous and magnesium chromites, 71*A*.
Neerfeld, H., X-ray determination of stresses, 33*A*.
Nemnonov, S. A., chromium electrodeposits, 25*A*.
Neumann, G.:
conservation of heat by regenerative heating, 144*A*.
induction gas burners, 120*A*.
Neumann, J. A., boron electrode coatings in welding cast iron, 53*A*.
Neumeister, H., weldable structural steel, 158*A*.
Newman, E. W., chromite deposits in Montana, 39*A*.
Nicholas, I. A., gun mixtures for repair of furnace walls, 100*A*.
Nicholls, C., elected Member, 8*P*.
Nicholls, H., elected Member, 8*P*.
Nichols, L. E., elected Member, 8*P*.
Nippes, E. F., use of cooling rates for evaluation of weldability of steel, 80*A*.
Noakes, J. E., elected Member, 8*P*.
Nolan, V. N., carbon and graphite mould plugs, 150*A*.
Noor, R., combustion in open-hearth furnaces, 99*A*.
Norrö, A., atmospheres in electric furnaces and hydrogen and nitrogen contents of steel, 48*A*.
Northcott, L., and **D. McLean:**
Paper: "The Influence of Centrifugal Casting upon the Structure and Properties of Steel," 303*P*. *Discussion*, 316*P*. *Correspondence*, 322*P*. *Authors' Reply*, 325*P*.
feeding of steel castings, 382*P*.
Nye, H. B., conveyors for small foundries, 98*A*.

Öberg, K., refractory material for tapping equipment, 143*A*.

O'Brien, T. F., heat-treatment of steels, 15*A*.
Ockelford, C. W. G., electric furnace determining volatile matter in coal, 161*A*.
Ode, W. H.:
carbonising properties of West Virginian coal, 144*A*.
carbonising properties of Western Region coals, 144*A*.
Oding, I. A., influence of induction on hardening steels, 32*A*.
Offenberg, W., rolling-mill furnaces, 101*A*.
Ogievetskiy, A. S., thickcoated welding electrodes, 21*A*.
Oliver, D. A., constitution of basic open-hearth slag, 547*P*.
O'Neill, H., properties of metals, 28*A*.
Orning, A. A., reactivity of solid fuels, 72*A*.
Osborn, C. J., transformation in ferrous alloys, 140*A*.
Osborn, H. B., jun., frequency and time cycle control for induction heating, 52*A*.
O'Sullivan, R., elected Associate, 9*P*.

Page, A. R., heat-treatment of tank-track spindles, 153*A*.
Pahlitzsch, G., refrigerated lubricants in machining of metals, 109*A*.
Paisov, I., effect of nitrogen in stainless steels, 138*A*.
Pallot, L. E., elected Associate, 9*P*.
Parakh, A. K., elected Member, 8*P*.
Parish, C. H., elected Member, 8*P*.
Parker, C. M., Jominy end-quench test in steel evaluation, 30*A*., 59*A*.
Parker, E. A., protection for black-oxide finishes on steels, 67*A*.
Parker, E. R.:
grain shape and grain growth, 63*A*.
spreading of liquid metals on solid metals, 83*A*.
stress and strain in tensile-test specimens, 134*A*.
Parkinson, E. H., elected Associate, 9*P*.
Parr, J. G., elected Associate, 9*P*.
Paschkis, V., heat-flow tests, 147*A*.
Paterson, D. G. P., identification of scrap, 11*A*.
Paterson, G. W., heat insulation, 143*A*.
Paterson, K., failure of mine winding-ropes, 57*A*.
Payne, C. A., elected Member, 8*P*.
Pearce, J. G., feeding of steel castings, 383*P*.
Pearson, O., spectrographic analyses, 100*A*.
Pearson, S. W., constitution of basic open-hearth slag, 560*P*.
Pearson, T. F.:
constitution of basic open-hearth slag, 545*P*.
control methods in steel industry, 148*A*.
Peltzer, O., sodium-nitrate patenting baths, 51*A*.

Pemberton, H. N., radiography in the steel foundry, 265*P*.
Pendred, V., elected Member, 8*P*.
Peplow, D. B., elected Associate, 9*P*.
Perry, J. L., the human side of engineering, 100*A*.
Perry, S. P., high-strength centrifugal castings, 75*A*.
Perry, W. C., patternmaking, 123*A*.
Petersen, F. A., tests for enamel coats on iron and steel, 132*A*.
Petrenko, O. S., briquetting of steel turnings, 11*A*.
Petrie, E. C., effect of reheating on fire-clay and silica refractories, 119*A*.
Petteford, C., nitrided steels, 105*A*.
Philbrook, W. O., slag control, 47*A*.
Philbrook, W. O., jun., slag control, 100*A*.
Phillips, W. J., water-quenching steel castings, 19*A*.
Phimister, D., elected Member, 8*P*.
Phipps, F. G., elected Member, 8*P*.
Phragmén, G., hydrogen equilibrium pressure in iron, 110*A*.
Picard, R. G., electron microscope for metals, 111*A*.
Pilcher, R. W., wartime food canmaking, 132*A*.
Pirie, J. W., pumping water containing acid, 159*A*.
Planner, B. P., tubes and tube making, 15*A*.
Pletnev, D. V., chromium plating of machine parts, 25*A*.
Plimpton, G. L., jun., segregation in rimming steel ingots, 11*A*., 48*A*., 99*A*.
Pluck, J. E., refractory materials for ladle linings, 557*P*.
Po, M. H., elected Member, 8*P*.
Podgorski, S. J. B., elected Member, 8*P*.
Pollard, R. E., stress-corrosion tests of steel wire, 141*A*.
Poole, S. W. :
flaking in alloy steels, 100*A*.
hardenability intensifiers, 100*A*.
segregation in alloy-steel ingot, 48*A*.
Pople, A. H., elected Member, 8*P*.
Porter, W. C., painting steel, 133*A*.
Post, C. B., air hardenability of steels, 59*A*.
Powell, L. :
Paper : "Emulsions of Oil in Water as Corrosion Inhibitors." *See* Hamer, P.
Pratt, R. S., elected Member, 8*P*.
Pratt, W. E., effects of oxygen exhaustion from corrosive solutions on alloy steels, 115*A*.
Prediger, H., binary systems of iron, 140*A*.
Preece, A., constitution of basic open-hearth, 562*P*.
Price, J. W., tin-lead alloy coatings on steel, 160*A*.
Price, T. M., Fontana steel plant of Kaiser Company Inc., 10*A*.
Prichard, B. S., elected Member, 8*P*.
Prosvirin, V. I., transformations in high-speed steel under pressure, 35*A*.
Pugacz, M. A. :
effect of post-heat in welding medium-alloy steels, 107*A*.
notched-bar impact tests on steels, 29*A*.
Pumphrey, W. I., powder metallurgy, 94*A*.
Püngel, W. :
galvanising properties of steel sheet, 26*A*.
increasing pliability of zinc coatings, 131*A*.
Putchinski, J., centrifugal castings, 8*A*.
Putich, B. M., temperature control in three-zone furnace, 102*A*.

Quartz, H. O., repairing large iron castings, 129*A*.
Queeney, J. P., lubricating water for plastic bearings, 126*A*.

Raine, E. M., elected Associate, 9*P*.
Raine, T., elected Member, 8*P*.
Rait, J. R., and **H. J. Goldschmidt** :
Paper : "The Constitution of Basic Steel Furnace Slags," 391*P*. *Joint Discussion*, 536*P*. *Joint Correspondence*, 557*P*. *Authors' Replies*, 563*P*.
Ramsay, G. D., raw materials supply in Fontana steel plant, 40*A*.
Ramsay, J. K., elected Member, 8*P*.
Ramseyer, C. F., sponge iron, 4*A*.
Randebaugh, R. J., microstructural guide to heat-treatment of carbon steel, 78*A*.
Rankine, A. W., shrink-fit stresses and deformations, 136*A*.
Rassenfoss, J. A., reproducibility of sand test results, 145*A*.
Reason, R. E., measurement of surface finish, 54*A*.
Reece, H. A., dependability of engineering property tests, 54*A*.
Rees, W. J., durability of refractories, 118*A*.
Reese, D. J., cupola practice, 44*A*.
Reeve, L., weldability of steel, 108*A*.
Reichert, J. W., reorganisation of British iron and steel industry, 9*A*.
Reid, W. T., coal-ash slag on furnace walls, 144*A*.
Reif, O., metallurgy of side-blown converter, 9*A*., 148*A*.
Reinacher, G., elastic modulus and damping capacity of iron-nickel alloys, 28*A*.
Reinartz, L. F., qualifications of open-hearth furnace foremen, 99*A*.
Reinfeld, H., smelting of Krivoi Rog ores, 3*A*.
Reiss, G. R., flame cutting under water, 53*A*.
Reitmeister, W., testing moulding sand, 75*A*.

Rekhter, S. D., oxy-acetylene surface hardening, 17*A*.
Reuschle, W., emulsions for lubricants, 126*A*.
Reynard, J. K., elected Associate, 9*P*.
Reynolds, D. A. :
carbonising properties of West Virginian coal, 144*A*.
carbonising properties of Western Region coals, 144*A*.
Rice, O. R., elected Member, 8*P*.
Richard, K., strength of metals under creep stress, 87*A*.
Richards, J. H., jun., advantages of coating compounds in drawing wire and tubing, 49*A*.
Richards, R. L., elected Member, 8*P*.
Richardson, H. M. :
action of chlorine on refractory materials, 71*A*.
refractory materials under stress, 92*A*.
Richardson, J. G., elected Associate, 9*P*.
Richey, W. H., effect of temperature and rolling speed on grain size of strip, 103*A*.
Rickett, R. L., isothermal transformation of some national emergency steels, 65*A*.
Riegel, G. C., correlating laboratory tests with service performance of machine parts, 33*A*.
Rigbey, J., double-exposure radiography, 64*A*.
Rikman, V. :
Soviet iron and steel industry in wartime, 46*A*.
Soviet iron ore supplies in wartime, 118*A*.
Riley, H. L., molecular nature of bituminous coals, 120*A*.
Riley, R. V. :
Paper : "A Further Note on the Microstructure of High-Silicon Acid-Resisting Iron." *See* Hurst, J. E.
Ritchie, J. G., spheroidising, 127*A*.
Roberds, W. M., induction heating, 18*A*.
Roberts, A., runners and risers, 123*A*.
Roberts, A. L., permeable refractories for furnaces, 40*A*.
Roberts, J., coals for carbonisation, 2*A*.
Roberts, W. J., gas flow control systems, 72*A*.
Robertshaw, A., determination of tin in steels, 159*A*.
Robertson, A. D., elected Associate, 9*P*.
Robertson, B., carbon distribution between titanium and iron in steels, 112*A*.
Robertson, F. L., constitution of basic open-hearth slag, 540*P*.
Robiette, A. G., high-frequency heating, 17*A*.
Robinson, A., properties of basic open-hearth slags, 537*P*.
Robinson, J. H., applications of powder metallurgy, 74*A*.
Robinson, L. R., pipe cleaning, 82*A*.
Robinson, N. W. F., elected Member, 8*P*.
Robitschek, J. M., carbon refractories for blast-furnaces, 40*A*.
Robson, W. D., silicosis in foundries, 97*A*.
Rodman, M. F., cutting metals under water, 22*A*.
Rogers, T. C., elected Member, 8*P*.
Rollason, E. C., arc-welded cutting alloys, 108*A*.
Rollinson, C. V., elected Member, 8*P*.
Romanoff, M., soil-corrosion studies, 141*A*.
Rooney, T. E., separation of lead from lead-bearing steels, 297*P*.
Rosa, J. A. :
flaking in alloy steels, 100*A*.
segregation in alloy-steel ingot, 48*A*.
Rose, K., resistance welding, 20*A*.
Rosenfeld, S. E., die casting, 7*A*.
Rosenthal, D., assessing weldability of steel, 21*A*.
Ross, E. F., foundry operations at works of Crane Co., Chicago, 8*A*.
Rote, F. B., behaviour of molybdenum in phosphorus-bearing grey cast iron, 62*A*.
Roth, W., continuous hardening of engine parts, 106*A*.
Rowden, E., effect of hydrocarbon gases on refractory materials, 1*A*.
Rowland, E. S., hardenability and carbon content of steels, 59*A*.
Roy, S., elected Associate, 9*P*.
Royce, H. M. W., elected Member, 8*P*.
Rudberg, E. G., elected Member, 8*P*.
Ruegg, R., aerodynamic turbine in the steel industry, 42*A*.
Ruffle, T. W., elected Member, 8*P*.
Russ, J. J., hardenability and carbon content of steels, 59*A*.
Russell, C. C., Gieseler plastometer for measuring plastic characteristics of coal, 73*A*.
Rustay, A. L., elected Member, 8*P*.
Ryan, W. E., relief of stresses in welds, 22*A*.

Sacchi, V. P. :
carburising with solid carburising materials, 16*A*.
case-hardening, 16*A*.
Sachs, G. :
effect of fibre on tensile strength of low-alloy steel, 55*A*.
effect of notches on tensile strength of low-alloy steels, 55*A*.
St. Claire-Johnson, G. H. G., elected Member, 8*P*.
Salmon, E. R., deep-drawing automobile pressings, 13*A*.
Salmon, W. H. :
formation of hot-tears in steel castings, 384*P*.
radiographic detection of faults, 263*P*.
Samarin, A., effect of nitrogen in stainless steels, 138*A*.
Samuels, J. O., flocculation and flotation in fuel recovery, 120*A*.
Sanderson, L., corrosion and heat-resisting steels, 111*A*.

Sandorff, P. E., properties of flash-welded tubing, 20*A*.
Sarkar, S., elected Associate, 9*P*.
Sartorius, R. G., cold working of spring steel, 152*A*.
Saunders, J. B., interferometer measurements on expansion of iron, 60*A*.
Saunders, W. R., elected Member, 8*P*.
Sawtelle, D. F., pulverised coal for producing malleable iron, 95*A*.
Scafe, R. M., hydrogen in open-hearth furnace, 99*A*.
Schaal, A., crystallite-deformation at surface of stressed parts, 29*A*.
Schabtach, C., damping of materials during flexual vibration, 135*A*.
Schack, A., regenerator calculations, 41*A*.
Schaeffler, A. L., hand-polishing of microspecimens, 63*A*.
Schauss, R. P., solidification rates of malleable iron, 95*A*.
Scheil, E., elastic modulus and damping capacity of iron-nickel alloys, 28*A*.
Scheil, M. A.:
stress-corrosion of austenitic stainless steels, 89*A*.
stress-corrosion cracking in austenitic stainless alloys, 112*A*.
Scheuer, E., moisture content of furnace atmospheres, 2*A*.
Schiffers, A., rolling-mill improvements, 50*A*.
Schikorr, G., weather-resistance of galvanised steel wire and rope, 67*A*.
Schleede, E. H., gypsum cement patterns, 97*A*.
Schmidt, B., gas burners, 2*A*.
Schmidt, K. A. F., colorimetric determination of phosphorus in steel, 68*A*.
Schmidt, U., powder metallurgy, 121*A*.
Schneble, A. W., jun., effects of superheating grey cast iron, 45*A*.
Schoenlaub, R. A., gun for making patches on furnace walls, 100*A*.
Schofield, T. H.:
Paper : "The Microscopical Examination of Samples of Lead-Bearing and Lead-Free Steels and Ingot Irons," 277*P*. *Joint Discussion*, 294*P*. *Joint Correspondence*, 296*P*. *Authors' Replies*, 299*P*.
lead in steel, 296*P*.
Schrader, H.:
heat-treatment of low-alloy high-speed steels, 106*A*.
machining efficiency increased by lead additions to steel, 54*A*.
Schrapes, A. C., heat-treatment problems, 18*A*.
Schreier, F., water supplies for iron and steel works, 46*A*.
Schröder, K., power-stations for steelworks, 2*A*.
Schuh, J. A., spectrographic equipment for metal control, 161*A*.
Schumacher, E. E., powder metallurgy, 122*A*.
Schwartz, H. A.:
solidification rates of castings, 124*A*.
tensile properties of low-alloy cast steels, 31*A*.
Schwencke, K., control of hydraulic presses, 12*A*.
Schwertner, F., nitrate baths for continuous patenting of steel wire for springs, 13*A*.
Seasholtz, A. P., interrupted quenching in salt baths, 106*A*.
Seaver, J. J., elected Member, 8*P*.
Seil, G. E., combustion in open-hearth furnaces, 99*A*.
Seliger, V., fatigue-testing apparatus, 137*A*.
Selvig, W. A., rare elements in coal, 72*A*.
Semmler-Alter, E., back-reflection and replica processes of using electron microscope, 111*A*.
Sentance, H. G. V., elected Member, 8*P*.
Sergeevich, V. L., mass hardening small parts by induction, 18*A*.
Sergeson, R., effects of heating and rolling blooms, billets and bars, 103*A*.
Shaw, J. A., determination of hydrocyanic acid in coke-oven gas, 117*A*.
Shepherd, B. F., martempering process, 53*A*.
Sherman, V. W.:
case-hardening by induction heating, 104*A*.
high-frequency heating for thin cases, 17*A*.
Shleyer, E. V., influence of high-frequency surface-hardening of steels, 32*A*.
Shomate, C. H., specific heats of ferrous and magnesium chromites, 71*A*.
Sidorishin, I. I., oxide film of iron-chromium-aluminium solid solutions, 115*A*.
Siebel, E.:
abbreviations for metallic materials, 33*A*.
creep strength of heat-resisting steels, 137*A*.
wear tests with dry-sliding friction, 157*A*.
Siegel, G. J., effect of post-heat in welding medium-alloy steels, 107*A*.
Sieveking, H. A., elected Member, 8*P*.
Silliman, W. A., liquid carburising of gears, 17*A*.
Silman, H., metal finishing, 130*A*.
Simmie, W. S., post-heat-treatment of spot-welded steels, 20*A*.
Simpson, P. R., elected Associate, 9*P*.
Sims, C. E., slag-metal reactions in acid open-hearth, 99*A*.
Singer, L., determination of chromium in steel, 116*A*.
Sisco, F. T., basic electric-furnace steel, 10*A*.
Sivkov, N. F., isothermal treatment of alloy steels, 127*A*.
Sjövall, H., magnetic tests of steel, 157*A*.
Smart, A., electro-plating on wire, 130*A*.

Smith, A. J. N., elected Member, 8*P*.
Smith, D. M., spectrographic analysis, 161*A*.
Smith, E. W., use of coke-oven gas, 41*A*.
Smith, G. A., elected Associate, 9*P*.
Smith, J. H., manufacture, testing and protection of steel water-pipes, 50*A*.
Smith, M. D., water corrosion of galvanised coatings and zinc, 67*A*.
Smith, P. A., elected Member, 8*P*.
Smith, P. C., electron microscope for metals, 111*A*.
Smith, T., roll designing, 103*A*.
Smoluchowski, R., spreading of liquid metals on solid metals, 83*A*.
Snader, E. A., magnetic particle test, 157*A*.
Snell, C. V., nitriding process, 50*A*.
Snelson, D. H., elected Associate, 9*P*.
Snodgrass, C. B., economic factors in metallurgy, 46*A*.
Snyder, T. M., sub-zero treatment of tool steels, 154*A*.
Snyder, W. B., power requirements and drives for merchant-bar and rod mills, 103*A*.
Sobers, W. B. :
analysis of iron and steel, 160*A*.
colorimetric determination of phosphorus, 68*A*.
Soderberg, K. G., plated lead coatings on steel, 83*A*.
Soler, G. :
electric-furnace quality versus open-hearth, 76*A*.
open-hearth furnace production and mill schedules, 99*A*.
Sommer, P., causes of failure of gudgeon pins, 137*A*.
Sosman, R. B., bath temperature measurement, 100*A*.
Soth, G. C., Gieseler plastometer, 73*A*.
Soudan, A. G., powder metallurgy, 122*A*.
Spenceley, W., inoculated cast iron, 5*A*.
Spiers, R., spectrographic determination of tungsten in steel, 117*A*.
Sprague, J. M., silver plating of steel, 132*A*.
Spraragen, W. :
distortion in welding, 129*A*.
properties of welds in carbon steels, 20*A*.
Spray, S., centrifugal casting of steel tubes, 318*P*.
Spruance, F. P., pickling alloy and mild steel wires, 82*A*.
Stanley, G. H., corrosion of pipes, 89*A*.
Stanley, J. K., preferred orientation, 157*A*.
Stansel, N. R., induction heating frequency formulae, 105*A*.
Stant, L., elected Member, 8*P*.
Stanton, J., elected Member, 8*P*.
Stanton, L. R. :
Paper : "Some Observations on the Austempering and Isothermal Transformation of Steels, with Special Reference to the Production of Martensite." *See* Thompson, F. C.
elected Member, 8*P*.
Stanworth, S., elected Member, 8*P*.
Starie, B., control for run-out tables, 15*A*.
Stearn, F. M., elected Associate, 9*P*.
Stedman, G. E. :
centrifugal steel casting, 124*A*.
deep-drawing steel, 150*A*.
Steele, S. D., determination of nitrogen in mild steel, 117*A*.
Steffes, M., blast-furnace-gas-fired mixer with recuperator, 41*A*.
Steinberg, D., nitriding ferro-alloys, 74*A*.
Steinberg, R. H., nitriding ferro-alloys, 74*A*.
Stengel, E., chemical analysis of open-hearth slags, 161*A*.
Stenkhoff, R., increasing pliability of zinc coatings, 131*A*.
Stephens, H. A., South Australian moulding sands, 123*A*.
Stephenson, N., elected Associate, 9*P*.
Stevens, H., cutting capacity of high-speed steel, 54*A*.
Stevens, W. R., steelworks lighting, 150*A*.
Stevenson, F. H., helium-shielded arc welding of stainless steel parts, 108*A*.
Stewart, J. A., wartime food canmaking, 132*A*.
Stewart, W. C., national emergency steels for large forgings, 87*A*., 158*A*.
Stirling, A., furnace insulation, 92*A*.
Stokes, A. J., elected Member, 8*P*.
Stokowiec, Z., elected Member, 8*P*.
Stolle, R., desulphurisation of iron, 5*A*.
Stone, M. D., shell forging, 77*A*.
Storch, H. H., hydrogenation and liquefaction of American coals, 144*A*.
Storm, H. F., surface heating by induction, 105*A*.
Strähuber, H. F., natural water supply for iron and steel works, 9*A*.
Strohecker, H. R., pickling equipment from welded material, 24*A*.
Subramaniam, V., elected Associate, 9*P*.
Summers, R. F., elected Member, 8*P*.
Summers, S., speech at Luncheon, 11*P*.
Swalheim, D. A., electroplating of steel strip, 27*A*.
Swartz, R. H., water-quenching of steel castings, 79*A*.
Sweet, J. M., elected Member, 8*P*.
Swift, A. W., sheet metal pressing, 150*A*.
Swift, H. W. :
deformation of metals, 135*A*.
wedge-drawing test, 136*A*.
Swift, L. L., gas producers and producer gas, 93*A*.
Swindale, J. D., elected Associate, 9*P*.
Swoboda, K., quenching oils for hardening steel, 128*A*.
Sykes, W. P., Ar′ reaction in iron alloys, 66*A*.
Sylwestrowicz, W., elected Member, 8*P*.

Tak-Ho-Sun :
hydrogen in solid steel, 160*A*.
hydrogen and oxygen in liquid steel, 160*A*.

Tate, B. D. N., section rolling, 126*A*.
Tate, D. R., microhardness indentation tests, 58*A*.
Taylor, D., macro-examination, 158*A*.
Taylor, F. :
chromate passivation, 25*A*.
pickling, 24*A*.
Taylor, H. F., heat-treatment of cast steel, 106*A*.
Taylor, R., radiography of non-uniform sections, 33*A*.
Taylor, W. B., elected Associate, 9*P*.
Temper, O. I., cracks in welds, 21*A*.
Tenenbaum, M., phosphorus in basic open-hearth furnaces, 99*A*.
Thiemann, T., equipment improvements in cold-rolling mill, 127*A*.
Thomas, C. E., lithium heat-treating atmospheres, 78*A*., 153*A*.
Thomas, I. J., elected Associate, 9*P*.
Thomas, O. J., South Wales steel industry in war-time, 147*A*.
Thomas, R. M., corrosion resistance of steel, 83*A*.
Thompson, F. C., and **L. R. Stanton** :
Paper : "Some Observations on the Austempering and Isothermal Transformation of Steels, with Special Reference to the Production of Martensite," 133*P*. *Correspondence*, 171*P*. *Authors' Reply*, 178*P*.
Thompson, L. S., elected Associate, 9*P*.
Thorneycroft, D. R., elected Associate, 9*P*.
Thornton, J., elected Associate, 9*P*.
Throssell, S. G., determination of blast-furnace profiles, 42*A*.
Thum, A., strength of metals under creep stress, 87*A*.
Thurman, A. L., electric equipment for wire-drawing machines, 49*A*.
Tigerschiöld, M., iron recovery in concentration of lean ores, 39*A*.
Timby, T. G., electrotinning of strip, 131*A*.
Tinti, R. von, tungsten, molybdenum and vanadium in chromium-steels, 61*A*.
Todd, F., humidity cabinet for corrosion tests, 36*A*.
Tofaute, W., diffused chromium coatings, 25*A*.
Tofft, L., blast-furnace gas mains inflated with coke-oven gas, 42*A*.
Tomlinson, A., elected Member, 8*P*.
Tomlinson, J. E., elected Associate, 9*P*.
Touceda, E. G., special steels for naval use, 32*A*., 88*A*.
Tovpenets, E. S., stresses resulting from different heat-treatments, 32*A*.
Towers, Helen, determining viscosity of acid open-hearth slags, 124*A*.
Townsend, C. D., plastic coatings for metals, 133*A*.
Townson, L. T., thermostatic control, 152*A*.
Traill, R. J., iron powder metallurgy, 122*A*.
Tranter, F. J., elected Member, 8*P*.
Tredennick, W. T., spalling test for refractories, 119*A*.
Trigger, K. J., double tempering high-speed steel at slow heating rate, 106*A*.
Trinks, W. :
holding time in heat-treatment specifications, 152*A*.
rate of heating steel, 12*A*.
Trossen, W., heat-treatable steels for nitriding, 61*A*.
Trurnit, W., polishing sintered-carbide drawing dies, 14*A*.
Tull, E. V., elected Associate, 9*P*.
Turnbull, D. C., fatigue life increased by shot-peening, 110*A*.
Twelvetrees, W. N., mechanical failures in aero-engines, 156*A*.

Uhlig, H. H., non-magnetic wire, 13*A*.
Uhrus, L. O., refractory materials for tapping equipment, 143*A*.
Ulrich, M., fatigue strength of gear wheels, 29*A*.
Underwood, L. R., metal-rolling practice, 15*A*.
Usher, I. A., hard chromium plating, 131*A*.

Vaill, R., Granite City Steel Company's plant, 46*A*.
Valentine, K. B., improving impact-stress endurance in gun parts, 85*A*.
Vanas, J., failure of forging die-shanks, 151*A*.
Vanselow, A. P., graphic calculator for spectrochemical analyses, 69*A*.
Vaska, W., evaluation of moulding sands, 96*A*.
Vaughan, J. L., hard chromium plating, 131*A*.
Vaughan, T. B., elected Associate, 9*P*.
Vedder, E. H., electronic control in steel industry, 103*A*.
Villner, L., atmospheres in electric furnaces and hydrogen and nitrogen contents of steel, 48*A*.
Vinner, I. S., annealing steel strip, 18*A*.
Vint, W. D., controlled atmospheres for annealing furnaces, 78*A*.
Vivian, A. C., rheology and strength of materials, 55*A*.
Vodicka, V., determining solidification rates, 124*A*.
Vogel, R., iron/iron-sulphide/iron-boride system, 140*A*.
Völkel, W., standardising construction of reheating furnaces, 12*A*.
Völker, W., tungsten, molybdenum and vanadium in chromium steels, 61*A*.
Vollrath, J. P., thermocouple protected by transparent tubes, 152*A*.
Vologdin, V. P., mass hardening small parts by induction, 18*A*.
Vorster, J. H., elected Member, 8*P*.
Vosburgh, F. J., graphite rods for risers, 6*A*.

Waddams, A. L., heat flow through granular material, 119*A*.
Waggoner, A. G., weldability of manganese steels, 107*A*.
Wain, R. A., elected Associate, 9*P*.
Wainwright, C., elected Member, 8*P*.
Walker, H. L., hardenability of 4150 steel, 30*A*.
Walker, J. L., heavy cutting, 108*A*.
Walker, T. R., use of past records in steel casting, 384*P*.
Wallquist, G. :
descaling of steel, 81*A*.
energy consumption in hot-rolling, 50*A*.
Walpole, K. W., mechanical failures in aero-engines, 156*A*.
Walters, C. P., effect of reheating on fireclay and silica refractories, 119*A*.
Warier, T. K., elected Member, 8*P*.
Waring, H. O. :
Paper : "A Note on the Relationship between Preliminary Heat Treatment and Response to Nitriding of some Nitriding Steels." *See* Hodgson, C. C.
Warriner, C., elected Member, 8*P*.
Washburn, T. S. :
deoxidation practice, 100*A*.
quality and production in open-hearth furnaces, 99*A*.
Waterbor, E. F., heading and gating malleable castings, 146*A*.
Waters, G. F., elected Associate, 9*P*.
Wean, R. J., equipment for rolling narrow strip, 15*A*.
Webb, E. H., calculator for wire-mill, 13*A*.
Webb, L. W. T., elected Member, 8*P*.
Weber, J. G., safety operation of centrifugal casting machines, 98*A*.
Webster, G. R., whiteheart malleable cast iron, 6*A*.
Weeks, G. W., elected Member, 8*P*.
Weiher, E. R., use of Jominy test after tempering, 110*A*.
Weill, A. R., X-ray diffraction, 111*A*.
Weisberg, M., protection for black-oxide finishes on steels, 67*A*.
Weisselberg, A., magnetic powder testing of steel bars, 137*A*.
Welchner, J., hardenability and carbon content of steels, 59*A*.
Wellauer, E. J., end-quench test for cast steel, 30*A*.
Wells, C. T., selective plating, 25*A*.
Wells, G. W., elected Member, 8*P*.
Welsh, N. C., elected Associate, 9*P*.
Wentrup, H., metallurgy of side-blown converter, 9*A*., 148*A*.
Wescott, B. B., national emergency steels for oil-well equipment, 62*A*.
Wesley, W. A., total-immersion corrosion tests, 88*A*.
Wheeler, M. A., elected Member, 8*P*.
Whitcomb, F. W., cold-treating high-speed steels, 19*A*.
White, J., constitution of basic open-hearth slag, 550*P*.
Whiteley, J. H. :
constitution of basic open-hearth slag, 547*P*.
ingot cracking, 388*P*.
lead in steel, 294*P*.
properties of centrifugally cast steel, 318*P*.
Whiting, M. A., crane hoist system, 125*A*.
Whittaker, J. W., manufacture and heat-treatment of hairsprings, 51*A*.
Whittemore, C. R., hard-surfacing by welding, 19*A*.
Wiegand, H., hard surface layers under operational stress, 157*A*.
Wiemer, H., dissociation of carbon monoxide in contact with iron and iron alloys, 43*A*.
Wiester, H. J., weldable structural steel, 158*A*.
Wilcoxson, L. S., pulverised coal for producing malleable iron, 95*A*.
Wiles, J. R., elected Member, 8*P*.
Wiley, Florence E., induction hardening of carbon steels, 52*A*.
Wiley, R. E., national emergency steels for large forgings, 87*A*., 158*A*.
Wilkes, T. O. G., elected Associate, 9*P*.
Wilkins, C. A. E., flame cutting of steel, 129*A*.
Wilks, C. R., end-quench hardenability test, 58*A*.
Willems, F., hydrogen in solid steel, 160*A*.
Willey, R. A., slag analysis, 69*A*.
Williams, D. C., tests of moulding sand, 6*A*.
Williams, H. T., properties of blast-furnace slags and strength tests on concrete/slag, 73*A*.
Williams, L. R., elected Member, 8*P*.
Williams, S. R., types of hardness tests, 86*A*.
Williams, T. L., elected Associate, 9*P*.
Williams, W. S., quasi-Bessemering process, 98*A*.
Wills, W. H., steel forgings for cutting tools, 102*A*.
Willsmere, L. A., elected Associate, 9*P*.
Wilson, C. V., elected Associate, 9*P*.
Wilson, R. W., elected Associate, 9*P*.
Winterton, K. :
Paper : "A Note on the Physical Properties of an Austenitic Weld-Metal and Its Structural Transformation on Straining," 87*P*.
Paper : "The Effect of Overheating on the Transformation Characteristics of a Nickel-Chromium-Molybdenum Steel," 79*P*.
Wissmann, C. C. :
acid electric steelmaking, 101*A*., 148*A*.
Wood, W. P., behaviour of molybdenum in phosphorus-bearing grey cast iron, 62*A*.
Workman, G. M., elected Associate, 9*P*.
Worth, D., elected Associate, 9*P*.
Wragge, W. B., lead-bearing steels, 297*P*.
Wrażej, W. J., hydrofluoric acid etching reagent, 107*P*.
Wright, H., award of Bessemer Gold Medal, 4*P*.

Wüstl, H., nitrate baths for continuous patenting of steel wire for springs, 13*A*.
Wylde, J. A., characteristics of whiteheart and blackheart malleable cast iron, 45*A*.

Yakovlev, G. M., high cutting speeds in machining metals, 23*A*.
Yanecek, F., blast-furnace design, 121*A*.
Yaslevich, A., effect of nitrogen on stainless steels, 138*A*.
Yates, J. L., maintenance of compressed-air equipment in foundries, 75*A*.
Yearley, B. C., solidification rates of malleable iron, 95*A*.
Yoder, C. M., slitting and cold-forming mills, 15*A*.

Zagrubskiy, A. M., chromium electrodeposits, 25*A*.
Zapffe, C. A.:
cleavage structures of iron-silicon alloys, 63*A*.
effect of dissolved gases on casting structure, 100*A*.
fractography, 63*A*.
Zapp, A. R., tungsten-carbide dies for wire drawing, 77*A*.
Zea, Y. K.:
Paper: "The Phosphorus Reaction in Basic Open-Hearth Practice," 459*P*. *Joint Discussion*, 536*P*. *Joint Correspondence*, 557*P*. *Authors' Replies*, 563*P*.
Zener, C., fracture of steel, 134*A*., 156*A*.
Ziegler, N. A., properties of cast chromium-molybdenum steels, 61*A*.
Ziesecke, L., back-reflection and replica processes of using electron microscope, 111*A*.
Zimnawoda, H., steel casting in Brazil, 145*A*.
Zvegintsev, S. K., tests for cracks in welding, 21*A*.

PRINTED IN GREAT BRITAIN BY RICHARD CLAY AND COMPANY, LTD., BUNGAY, SUFFOLK.

alloys,
casting
ies for
tion in
' 459*P*.
nt Cor-
Replies,
56*A*.
omium-
replica
micro-
Brazil,
cks in